QH1.U55
3324

# MARINE POLYCHAETE WORMS FROM POINT BARROW, ALASKA, WITH ADDITIONAL RECORDS FROM THE NORTH ATLANTIC AND NORTH PACIFIC

BY

MARIAN H. PETTIBONE

No. 3324.—From the Proceedings of the United States National Museum
Vol. 103, pp. 203–356, figs. 26–39

JUN 1954

SMITHSONIAN INSTITUTION
UNITED STATES NATIONAL MUSEUM
WASHINGTON, D. C.
1954

PROCEEDINGS OF THE UNITED STATES NATIONAL MUSEUM

issued by the

SMITHSONIAN INSTITUTION
U. S. NATIONAL MUSEUM

Vol. 103 Washington : 1954 No. 3324

# MARINE POLYCHAETE WORMS FROM POINT BARROW, ALASKA, WITH ADDITIONAL RECORDS FROM THE NORTH ATLANTIC AND NORTH PACIFIC

By Marian H. Pettibone

This report of the Arctic polychaetes found in the region of Point Barrow, Alaska, is based on material collected during 1948, 1949, and 1950 by G. E. MacGinitie, of the Arctic Research Laboratory. Specimens were obtained from Eluitkak Pass, Elson Lagoon, near Point Barrow, were washed ashore at the Point Barrow base, and were dredged within 16 miles offshore at Point Barrow base in depths of 1.7 to 123.5 fathoms on bottoms of mud, stones, gravel, rocks, in masses of worm tubes, and various combinations of these. Additional specimens were collected from fish traps, from screen traps lowered through holes made in the ice, and from plankton hauls, some of which were made through holes in the ice. The latter collections are of particular interest in that they include specimens showing sexual epitokous stages of some of the syllids. Considerable care was taken in going over the miscellaneous material and separating polychaetes, as evidenced by the large collection and the presence in it of many small specimens of the young of larger species as well as small species which are often overlooked. There are a great number of small syllids, phyllodocids, hesionids, and terebellids. Great care also was taken in the preservation of the specimens. Some color notes were included and some color photographs were taken, and these added considerably to the value of the collection.

The material was worked on by the writer at the U. S. National Museum, where the collection is deposited. The facilities of the Museum, including laboratory accommodations, the library, and the vast

polychaete collections, which include much type material, were placed at the writer's disposal. Some previously unworked material was examined for comparative purposes, and the results of some of these related studies are included here. This material is chiefly from collections made by the following: R. A. Bartlett in the Canadian Arctic, Greenland, and Labrador from 1927 to 1942; W. H. Dall in Arctic Alaska, the Bering Sea, and southeastern Alaska from 1871 to 1880; the *Blue Dolphin* expeditions to Labrador and Newfoundland from 1949 to 1951 under the command of D. C. Nutt; the U. S. Fish Commission in dredgings off the east coast of North America, from which many specimens had been identified and recorded by A. E. Verrill; and by the writer in the Straits of Juan de Fuca, in Washington and Puget Sounds, Washington, chiefly during the summers from 1936 to 1940, and from the region of Woods Hole, Massachusetts, in the summers of 1950 and 1951. For the last three collections mentioned, only summaries of the data are given for species common to the Point Barrow region. More complete data are to be published separately and the summaries are included here only to make the distributional data of the Point Barrow species more complete.

The number of polychaetes previously recorded from Arctic Alaska is small indeed. The collection obtained by the International Polar Expedition to Point Barrow from 1881 to 1883 included only 17 polychaetes (Murdoch, 1885, p. 152). This collection, which was deposited in the U. S. National Museum, was examined by the writer and is referred to in this report. A few additional records in scattered papers have added to the list of polychaetes of Arctic Alaska.

For each of the species, a rather full but by no means complete synonymy is given, chiefly bringing together references to the original and additional descriptions and scattered distributional records. To facilitate identification, keys to the families, genera, and species are given, as well as synopses of the families and brief descriptions of the species with size ranges and color notes. An explanatory key to the lettering of the diagnostic features in the figures is given on page 210.

This study was aided by a contract between the Office of Naval Research, Department of the Navy, and Johns Hopkins University (Project No. NR 162 911, Contract and Task Order No. N6onr 243–16).

The writer acknowledges her appreciation to Prof. and Mrs. G. E. MacGinitie for their cooperation and help on this project; to the authorities of the U. S. National Museum for allowing her to make use of the facilities of the Institution, especially to Dr. Waldo L. Schmitt and Dr. Fenner A. Chace, Jr., for their valuable aid, suggestions, and patience; and to Mr. and Mrs. Cyril Berkeley, of Nanaimo, British Columbia, for their loan of specimens and their valuable suggestions.

The distribution of the Point Barrow polychaetes is summarized in table 1.

The collections include 3,270 specimens representing 88 species and 26 families of Polychaeta. Some of the species were exceedingly common; others were represented only by single or few specimens. The Polynoidae, Syllidae, and Terebellidae are the most abundant both as to numbers of species (11 each, or 37 percent) and specimens (66 percent). The Phyllodocidae and Sabellidae have 7 species each. Eleven families are represented by a single species each.

During 1948, because of the ice floes all summer, there was no heavy surf and practically nothing was washed up on the beach. During 1949, specimens were washed ashore on 17 different days. In 1950, specimens were collected from the beach on only one day. Altogether, 287 specimens of polychaetes were washed ashore, representing 20 species and 11 families. Two species, *Eunoë clarki* (2 specimens) and *Travisia carnea* (12 specimens), were obtained in this manner only. Four species were dredged occasionally but were washed ashore in much larger numbers, namely: *Antinoë sarsi* (58 specimens), *Melaenis lovéni* (65 specimens), *Arenicola glacialis* (54 specimens), and *Brada villosa* (24 specimens). Additional species were commonly obtained in the dredge but were washed ashore in small numbers.

On three occasions in 1950 when 80-foot vertical plankton hauls were taken through holes in the ice, the sexual stages of three of the syllids were found—*Autolytus fallax, Syllis cornuta,* and *Syllis fasciata.*

A station 12.1 miles from shore, 123.5 fathoms, August 17, 1949, produced literally bushels of worm tubes. The tubes of the terebellid *Pista maculata* made up the greater part of the mass.

Of the 88 Point Barrow species, 75 (85.2%) are common to the Arctic, Atlantic, and Pacific; 5 (5.7%) are common only to the Arctic and Pacific (*Gattyana ciliata, Eusyllis magnifica, Pionosyllis compacta, Glycinde wiréni,* and *Idanthyrsus armatus*); 3 (3.4%) are common to the Arctic and Atlantic (*Autolytus fallax, Eumida minuta, Travisia carnea*); 4 (4.5%) are confined to the Arctic (*Eunoë clarki, Nerinides* sp., *Arenicola glacialis, Ampharete vega*); and 1 (1.1%) is bipolar, known only from the Arctic and Antarctic (*Ammotrypane breviata*).

The Point Barrow records help to complete the circumpolarity records for 58 circumpolar or almost circumpolar species, some of which previously had been known only from the Siberian and Canadian Arctic, Greenland, and Spitsbergen. The range has been extended for 28 species, 6 of which have been extended by combining Atlantic and Pacific specific names.

TABLE 1.—*Distribution of species*

| Families and species | Page reference | Number of specimens | Ecological distribution | | | | | Geographic distribution | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Washed ashore | Dredged on mud bottom (31 species) | Dredged on bottom of stones, gravel, pebbles, with mud (51 species) | Dredged on bottom of rocks, stones, gravel (74 species) | Dredged in masses of worm tubes (35 species) | Mainly Arctic (18 species, 20%) | Arctic-boreal (30 species, 34%) | Arctic-boreal-lusitanian (18 species, 20%) | Cosmopolitan (21 species, 24%) | Bipolar (1 species, 1%) |
| POLYNOIDAE (922 specimens) | | | | | | | | | | | | |
| Melaenis lovéni Malmgren | 214 | 67 | x | | x | | | x | | | | |
| Antinoë sarsi Malmgren | 215 | 63 | x | x | | x | | | x | | | |
| Eunoë clarki Pettibone | 217 | 2 | x | | | | | x | | | | |
| Eunoë nodosa (Sars) | 217 | 33 | | | x | x | | | x | | | |
| Eunoë oerstedi Malmgren | 219 | 20 | | | x | x | | | x | | | |
| Harmothoë imbricata (Linné) | 220 | 215 | x | x | x | x | x | | | x | | |
| Harmothoë extenuata (Grube) | 222 | 375 | | x | x | x | x | | | | x | |
| Enipo gracilis Verrill | 225 | 3 | | | | x | x | | x | | | |
| Arcteobia anticostiensis (McIntosh) | 225 | 14 | x | x | | x | x | | x | | | |
| Gattyana cirrosa (Pallas) | 226 | 126 | x | x | x | x | x | | x | | | |
| Gattyana ciliata Moore | 228 | 4 | | | | x | | | x | | | |
| SIGALIONIDAE (30 specimens) | | | | | | | | | | | | |
| Pholoë minuta (Fabricius) | 230 | 30 | | | | x | x | | | | x | |
| PHYLLODOCIDAE (192 specimens) | | | | | | | | | | | | |
| Mystides borealis Théel | 232 | 2 | | | | x | | | | | x | |
| Eteone barbata (Malmgren) | 233 | 4 | | | x | x | | | x | | | |
| Eteone longa (Fabricius) | 234 | 40 | | x | x | x | | | x | | | |
| Eteone flava (Fabricius) | 235 | 22 | | x | x | x | | | x | | | |
| Eteone spetsbergensis Malmgren | 235 | 4 | | x | x | x | | x | | | | |
| Phyllodoce groenlandica Oersted | 236 | 74 | x | x | x | x | x | | x | | | |
| Eumida minuta (Ditlevsen) | 238 | 46 | | | | x | | x | | | | |
| HESIONIDAE (28 specimens) | | | | | | | | | | | | |
| Castalia aphroditoides (Fabricius) | 239 | 28 | | x | x | x | | x | | | | |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Syllidae** (789 specimens) | | | | | | | | | | | |
| Autolytus alexandri Malmgren | 246 | 53 | | | x | x | x | | x | | | |
| Autolytus fallax Malmgren | 247 | 107 | x | x | x | x | | x | | | | |
| Autolytus prismaticus (Fabricius) | 249 | 11 | | | x | x | | | x | | | |
| Syllis cornuta Rathke | 253 | 109 | | | x | x | x | | | | x | |
| Syllis fasciata Malmgren | 254 | 208 | | x | x | x | x | | x | | | |
| Sphaerosyllis erinaceus Claparède | 255 | 37 | | | | x | | | x | | | |
| Exogone naidina Oersted | 258 | 82 | | | x | x | x | | | x | | |
| Exogone dispar (Webster) | 259 | 3 | | | | x | | | | x | | |
| Eusyllis blomstrandi Malmgren | 260 | 175 | x | | x | x | x | | | x | | |
| Eusyllis magnifica (Moore) | 261 | 2 | | | x | | | | x | | | |
| Pionosyllis compacta Malmgren | 262 | 2 | | | | x | x | x | | | | |
| **Nereidae** (22 specimens) | | | | | | | | | | | | |
| Nereis pelagica Linné | 264 | 10 | | | | x | | | | | x | |
| Nereis zonata Malmgren | 265 | 12 | | | | x | x | x | | | | |
| **Nephtyidae** (61 specimens) | | | | | | | | | | | | |
| Nephtys longosetosa Oersted | 268 | 16 | x | | x | | | | | | x | |
| Nephtys ciliata (Müller) | 270 | 37 | | x | x | x | | | x | | | |
| Nephtys discors Ehlers | 270 | 5 | x | x | x | x | x | | x | | | |
| Nephtys paradoxa Malm | 271 | 3 | | x | | | x | | x | | | |
| **Glyceridae** (1 specimen) | | | | | | | | | | | | |
| Glycera capitata Oersted | 272 | 1 | | | | x | | | | | x | |
| **Goniadidae** (5 specimens) | | | | | | | | | | | | |
| Glycinde wiréni Arwidsson | 274 | 5 | | | x | x | | x | | | | |
| **Lumbrineridae** (29 specimens) | | | | | | | | | | | | |
| Lumbrineris fragilis (Müller) | 275 | 29 | | x | x | x | x | | | x | | |
| **Orbiniidae** (19 specimens) | | | | | | | | | | | | |
| Scoloplos armiger (Müller) | 278 | 19 | | x | x | x | | | | | x | |
| **Spionidae** (22 specimens) | | | | | | | | | | | | |
| Polydora caulleryi Mesnil | 280 | 16 | | | x | x | | | x | | | |
| Prionospio malmgreni Claparède | 282 | 2 | | | | x | | | | x | | |
| Spio filicornis (Müller) | 284 | 2 | | | | x | | | x | | | |
| Nerinides sp | 285 | 2 | | | | | | x | | | | |
| **Cirratulidae** (212 specimens) | | | | | | | | | | | | |
| Cirratulus cirratus (Müller) | 286 | 183 | | | x | x | | | | | x | |
| Chaetozone setosa Malmgren | 287 | 29 | | | x | x | x | | | | x | |
| **Flabelligeridae** (50 specimens) | | | | | | | | | | | | |
| Flabelligera affinis Sars | 289 | 15 | x | | x | x | x | | | | x | |
| Brada villosa (Rathke) | 290 | 26 | x | | x | x | | | | | x | |
| Brada inhabilis (Rathke) | 292 | 9 | | | | x | x | x | | | | |

TABLE 1.—*Distribution of species*—Continued

| Families and species | Page reference | Number of specimens | Ecological distribution | | | | | Geographic distribution | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Washed ashore | Dredged on mud bottom (31 species) | Dredged on bottom of stones, gravel, pebbles, with mud (51 species) | Dredged on bottom of rocks, stones, gravel (74 species) | Dredged in masses of worm tubes (35 species) | Mainly Arctic (18 species, 20%) | Arctic-boreal (30 species, 34%) | Arctic-boreal-lusitanian (18 species, 20%) | Cosmopolitan (21 species, 24%) | Bipolar (1 species, 1%) |
| SCALIBREGMIDAE (17 specimens) | | | | | | | | | | | | |
| Scalibregma inflatum Rathke | 293 | 17 | x | x | x | x | x | | | | x | |
| OPHELIIDAE (14 specimens) | | | | | | | | | | | | |
| Ammotrypane breviata Ehlers | 295 | 2 | | | | x | | | | | | x |
| Travisia carnea Verrill | 296 | 12 | x | | | | | | x | | | |
| CAPITELLIDAE (26 specimens) | | | | | | | | | | | | |
| Capitella capitata (Fabricius) | 298 | 26 | | | | x | | | | | x | |
| ARENICOLIDAE (57 specimens) | | | | | | | | | | | | |
| Arenicola glacialis Murdoch | 300 | 57 | x | | x | | | x | | | | |
| MALDANIDAE (35 specimens) | | | | | | | | | | | | |
| Praxillella praetermissa (Malmgren) | 303 | 10 | | | x | x | | | | x | | |
| Maldane sarsi Malmgren | 303 | 1 | | | x | | | | | | x | |
| Nicomache lumbricalis (Fabricius) | 305 | 18 | | x | | x | x | | | | x | |
| Nicomache personata Johnson | 306 | 5 | | | | x | | | x | | | |
| Petaloproctus tenuis (Théel) | 306 | 1 | | | | | x | | x | | | |
| SABELLARIIDAE (6 specimens) | | | | | | | | | | | | |
| Idanthyrsus armatus Kinberg | 308 | 6 | | x | | x | | | | x | | |
| STERNASPIDAE (5 specimens) | | | | | | | | | | | | |
| Sternaspis scutata (Ranzani) | 309 | 5 | | x | x | | | | | | x | |
| PECTINARIIDAE (72 specimens) | | | | | | | | | | | | |
| Pectinaria granulata (Linné) | 312 | 53 | x | x | x | x | x | | x | | | |
| Pectinaria hyperborea (Malmgren) | 314 | 19 | | x | x | x | x | | x | | | |
| AMPHARETIDAE (41 specimens) | | | | | | | | | | | | |
| Ampharete vega (Wirén) | 315 | 1 | | | | | | x | | | | |
| Ampharete acutifrons (Grube) | 316 | 17 | x | x | x | x | | | | x | | |
| Ampharete goësi Malmgren | 317 | 20 | | | x | x | x | x | | | | |
| Asabellides sibirica (Wirén) | 318 | 3 | | x | | | | x | | | | |

| | | |

## Explanation of symbols on figures

Roman numerals indicate body segments.

a, anus
aBr, anal branchia
aC, anal cirrus
aCo, anal cone
aCy, anal cylinder
aK, anal knob
aLi, anal ligule
abd, abdominal region
ac, aciculum (heavy spine buried in parapodial ramus)
acH, acicular genital hook
acL, acicular lobe
ach, achaetous lobe
ai, aileron of jaw
an, antenna
antLa, anterior or presetal lamella
anta, antanal achaetous segment
ba, barbule
bl, blade of seta (terminal or end piece of composite or jointed seta)
br, branchia
brF, branchial filament
brLo, branchial lobe
brP, brood pouch
buS, buccal segment
cP, cephalic peak
cCre, cephalic crest
cPl, cephalic plate
cR, cephalic ridge
caPl, calcareous plate
co, collarette
cph, cirrophore (base of a tentacular cirrus or a dorsal cirrus)
cr, crotchet
cre, crest
dC, dorsal cirrus
dL, dorsal lobe
dN, dorsal notch
dTu, dorsal tubercle (lobe corresponding to elytrophore on non-elytra-bearing segment)
deR, denticled rim
Dor, dorsal
el, elytron or scale
elph, elytrophore (lobe bearing elytron)
ey, eye-spot
fTu, facial tubercle
frAn, frontal antenna
frH, frontal horn
j, jaw
lAn, lateral antenna
lGr, lateral groove
lLo, lateral lobe
lN, lateral notch
lOr, lateral sensory organ
liPl, limbate plate
loL, lower lip
mAn, median antenna
mLo, median lobe
maxR, maxillary or distal ring
mo, mouth
nPa, nephridial papilla
ne, neuropodium or ventral ramus
neC, neuropodial cirrus
neLi, neuropodial ligule
neS, neuroseta (seta of neuropodium)
neTo, neuropodial torus
no, notopodium or dorsal ramus
noLi, notopodial ligule
noS, notoseta (seta of notopodium)
noPi, notopodial pinnule
noTo, notopodial torus
nuEp, nuchal epaulette
nuF, nuchal fold, lobe or collar
nuG, nuchal groove
nuH, nuchal hook
nuO, nuchal organ
nuPa, nuchal papilla
oR, oral or basal ring
oT, oral tentacles
ocT, occipital tubercle
op, operculum
opPe, opercular peduncle
p, palp
pM, palmar membrane
pa, papilla
pal, paleae
parF, parapodial flange
para, paragnaths or horny denticles
parath, parathoracic segment
poL, postsetal or posterior lobe
poLa, postsetal or posterior lamella
pr, prostomium
preL, presetal or anterior lobe
pro, proboscis
pyF, pygidial or anal funnel
pyPl, pygidial plate

s, seta
scH, scaphal hook
set, setigerous segment or setiger
setLo, setigerous lobe
sh, shaft of seta (basal part of composite or jointed seta)
spH, special hook
tC, tentacular cirrus
tF, tentacular filament
tM, tentacular membrane
tS, tentacular segment or peristomium (anterior modified segments around mouth)
th, thoracic region
thM, thoracic membrane
to, tooth
tor, torus (low, inflated parapodial lobe)
uL, upper lip
un, uncinus (very small and short, flattened setal hooks)
unPi, uncinigerous pinnule (flattened parapodial ramus bearing numerous uncini or small setal hooks)
unTo, uncinigerous torus (low, inflated parapodial ramus bearing numerous uncini or small setal hooks)
vC, ventral cirrus
vF, ventral faecal groove
vL, ventral lobe
vPa, ventral papilla
vSh, ventral shield
Ven, ventral
w, basal crenulate wing

## Order POLYCHAETA

### Key to the families of Polychaeta from Point Barrow

1. Dorsal surface more or less completely covered by paired overlapping scales or elytra (fig. 26, *a*) ---- 5
   Dorsal surface not covered by elytra ---- 2
2. Anterior end more or less concealed by feathery tentacles (fig. 38, *a*), chitinous golden setae forming an operculum (figs. 34, *n*; 35, *d*), long setae directed forward forming a cephalic cage, or long filamentous outgrowths (fig. 36, *f*). With more or less permanent tubes ---- 6
   Anterior end otherwise ---- 3
3. Body thickly papillated, grub-shaped ---- 21
   Body smooth or finely granulated ---- 4
4. Prostomium with conspicuous antennae, with or without fleshy palps (figs. 26–30), or prostomium or an anterior segment with pair of long, prehensile, tentacular palps (fig. 32, *i*) ---- 13
   Prostomium without palps and without conspicuous antennae (fig. 32, *a*) or with 2 pairs minute antennae (figs. 30, *j*; 31, *a*, *e*) ---- 18
5. Elytra on all segments of posterior region (at least from segment 29 on). Dorsal cirri lacking ---- **Sigalionidae** (p. 228)
   Elytra not on all segments of posterior region. With paired dorsal cirri on segments without elytra (fig. 26, *a*) ---- **Polynoidae** (p. 213)
6. Anterior end with branchial plume (fig. 38, *a*) ---- 7
   Anterior end without branchial plume ---- 8
7. Branchial filaments without operculum. Without thoracic membrane. Tube gelatinous, membranous, or horny, covered or not with mud, sand, gravel, and debris ---- **Sabellidae** (p. 332)
   Usually 1 or 2 opercula on modified branchial filaments (fig. 39, *u*). Usually with thoracic membrane (fig. 39, *u*). Tube calcareous ---- **Serpulidae** (p. 342)
8. Anterior end with chitinous, golden setae forming an operculum (figs. 34, *n*; 35, *d*). In free, conical, sandy tubes or concreted sandy tubes attached to rocks, shells, etc ---- 12
   Anterior end without opercular setae. Tube otherwise ---- 9

9. Setae of anterior segments directed anteriorly, forming a cephalic cage. Body covered with papillae and often with adherent sand grains; may be encased in thick mucoid sheath ..... **Flabelligeridae** (p. 288)
Anterior end without cephalic cage but with long, filamentous outgrowths (may have 2 groups of paleal setae directed forward; fig. 36, *a*, *e*, *f*). Body without papillae ..... 10
10. Anterior end with long, filamentous outgrowths and with similar outgrowths continued along sides of body on few to many segments (fig., 33, *a*). Segments similar, body not divided into 2 distinct regions.
**Cirratulidae** (p. 285)
Long, filamentous outgrowths concentrated on anterior region only (figs. 36, 37). Body with 2 distinct regions ..... 11
11. With numerous filiform oral tentacles retractile in mouth (fig. 36, *e*). Anterior region with or without 2 groups of paleal setae directed forward (fig. 36, *a*, *b*) ..... **Ampharetidae** (p. 314)
With numerous, grooved, oral tentacles not retractile in mouth (fig. 36, *f*, *g*, *i*). Anterior region without paleal setae ..... **Terebellidae** (p. 318)
12. Opercular setae forming 1–3 concentric rows (fig. 34, *n–q*). Tube of concreted sand or fine gravel, attached ..... **Sabellariidae** (p. 307)
Opercular setae forming 2 bundles in horizontal rows, directed obliquely anteriorly (fig. 35, *c*, *d*). Tube free, conical, rigid, open at both ends, formed of single layer of sand grains ..... **Pectinariidae** (p. 310)
13. Prostomium with 2–5 conspicuous antennae. With 1–8 pairs tentacular cirri (figs. 27–29) ..... 14
Prostomium without conspicuous antennae. Without tentacular cirri. With pair of tentaculiform, longitudinally-grooved palps (deciduous, may be missing; figs. 32, *i*; 33, *d*) ..... 17
14. Dorsal cirri flattened, foliaceous, sometimes overlapping, or more or less globular (fig. 27). Prostomium with 2 eyes, 4–5 antennae, without palps ..... **Phyllodocidae** (p. 231)
Dorsal cirri otherwise. Prostomium with 4–6 eyes, 2–3 antennae, 2 palps (may be reduced and fused in Syllidae) ..... 15
15. With parapodial ligules, rounded, conical or straplike lobes (fig. 30, *b*, *c*). Dorsal cirri short, cirriform ..... **Nereidae** (p. 263)
Without parapodial ligules. Dorsal cirri filiform, may be more or less articulated (or small and subulate in some Syllidae) ..... 16
16. Palps biarticulate (fig. 28, *a*) ..... **Hesionidae** (p. 239)
Palps not biarticulate (may be reduced and fused; figs. 28, *c*; 29, *a*).
**Syllidae** (p. 240)
17. Parapodia with postsetal lamellae more or less developed (fig. 32, *g*). Branchiae usually paired, dorsal, ligulate or cirriform (rarely pinnate, rarely lacking) ..... **Spionidae** (p. 280)
Parapodia with lobes scarcely projecting, without postsetal lamellae. Branchiae simple, filamentous, contractile, inserted above notopodia on few to many segments (fig. 33, *d*) ..... **Cirratulidae** (p. 285)
18. Prostomium with 2 pairs minute antennae (figs. 30, *j*; 31, *a*) ..... 19
Prostomium without antennae ..... 22
19. Prostomium subquadrate, with small antennae on anterior part (fig. 30, *j*). With anterior and posterior parapodial lamellae more or less developed (fig. 30, *k–n*) ..... **Nephtyidae** (p. 266)
Prostomium conical, pointed, annulated, with tiny terminal antennae (fig. 31, *a*, *e*). Without parapodial lamellae ..... 20

20. Segments bi- or triannulate. Parapodia of single form throughout length of body, either only uniramous or only biramous ..... **Glyceridae** (p. 272)
Segments uniannulate. Body divided into 2 regions—anterior uniramous, posterior biramous (fig. 31, *f*, *g*) ..... **Goniadidae** (p. 274)
21. Posterior part of body with 2 horny ventral plates with radiating bundles of setae (fig. 35, *b*) ..... **Sternaspidae** (p. 309)
Posterior part of body without horny plates ..... **Flabelligeridae** (p. 288)
22. Some of segments considerably elongated, much longer than wide. Anal segment with limbate plate, spatulate, or funnellike (fig. 34, *d*, *h*, *m*). Prostomium hoodlike (fig. 34, *i*, *l*) or with limbate plate (fig. 34, *b–c*, *g*). **Maldanidae** (p. 302)
Segments not much longer than wide ..... 23
23. Proboscis provided with dark, chitinous jaw pieces (fig. 31, *i*). Body smooth, elongate, cylindrical, resembling an earthworm. Parapodia weakly developed simple lobes ..... **Lumbrineridae** (p. 275)
Proboscis without chitinous jaws. Form variable ..... 24
24. Body divided into 2 weakly to sharply separable regions, short anterior region, more or less flattened, with cushionlike neuropodia with several rows of setae, and long cylindrical posterior region with parapodial lobes projecting dorsally (fig. 32, *c*) ..... **Orbiniidae** (p. 278)
Parapodial lobes of median and posterior regions not projecting dorsally .. 25
25. Prostomium conical ..... 26
Prostomium otherwise ..... 27
26. Body short, grub-shaped or lancet-shaped. Parapodia with simple capillary setae only ..... **Opheliidae** (p. 295)
Body elongate, slender, fragile. Parapodia with capillary setae and, in long posterior region, with rows of hooded hooks on somewhat inflated tori (fig. 33, *t*) ..... **Capitellidae** (p. 298)
27. Arborescent branchiae limited to anterior few segments. With capillary and forked parapodial setae ..... **Scalibregmidae** (p. 293)
Arborescent branchiae on long middle region of body. With capillary setae and sigmoid hooks embedded in elongated tori ..... **Arenicolidae** (p. 300)

## Family Polynoidae

Prostomium bilobed, with two pairs of eyes in trapezoidal arrangement, three dorsal antennae, a pair of subulate ventral palps. First or tentacular segment with setae reduced in number (0–3), with two pairs of tentacular cirri (fig. 26, *a*). Parapodia biramous, with setae simple (not compound), paired dorsal scales or elytra on certain segments and paired dorsal cirri on non-elytra-bearing segments, paired subulate ventral cirri (fig. 26, *a*, *d*). Pygidium or anal segment with pair of anal cirri. Paired segmental or nephridial papillae near ventral bases of parapodia. Muscular proboscis eversible, with circle of soft marginal papillae and two pairs of interlocking, chitinous jaws.

Represented by 7 genera and 11 species. All the genera considered here have 15 pairs of elytra on segments 2, 4, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 26, 29, 32; lateral antennae inserted ventral to median antenna on prostomium (fig. 26, *a*).

### Key to the genera of Polynoidae from Point Barrow

1. Notosetae stouter than or at least as stout as neurosetae, with tips blunt to pointed, not capillary ..... 2
   Notosetae not as stout as neurosetae ..... 5
2. Notosetae large, smooth or with only faint transverse striations, few in number (5–9) ..... **Melaenis** (p. 214)
   Notosetae with transverse spinous rows, more numerous (more than 10) ... 3
3. Neurosetae long, slender, at least some end in capillary tips ..... **Antinoë** (p. 215)
   Neurosetae stouter, with tips straight or slightly hooked, not capillary ..... 4
4. All neurosetae with entire bare tips ..... **Eunoë** (p. 216)
   Some of neurosetae bidentate, with secondary tooth well developed or rudimentary (fig. 26, *e*) ..... **Harmothoë** (p. 220)
5. Some notosetae with capillary tips. Segments less than 40 (35–38), thus, posterior end of body covered with elytra ..... 6
   None of notosetae with capillary tips. Segments more than 40 (45–65), thus, a rather long posterior end without elytra. Elytra smooth, without tubercles ..... **Enipo** (p. 225)
6. Neurosetae of 2 kinds, upper few end in slender tips, rest end in bifid tips. Elytra smooth except for few microtubercles on anterior curved part. **Arcteobia** (p. 225)
   Neurosetae all similar, with entire tips. Elytra with microtubercles and sometimes also with macrotubercles ..... **Gattyana** (p. 622)

## Genus *Melaenis* Malmgren, 1865

### *Melaenis lovéni* Malmgren, 1865

*Melaenis lovéni* Malmgren, 1865, p. 78, pl. 10, fig. 10.—Théel, 1879, p. 22.—Wirén, 1883, p. 391, pl. 28, fig. 4; pl. 29, fig. 3.—Murdoch, 1885, p. 152.—Moore, 1908, p. 337.—Fauvel, 1914, p. 49.—Augener, 1928, p. 695.—Ditlevsen, 1937, p. 16.—Gorbunov, 1946, p. 38.—Wesenberg-Lund, 1950a, p. 9; 1950b, p. 29.

*Melaenis lovéni* var. *gigantea* Wirén, 1883, p. 391, pl. 28, fig. 3; pl. 29, fig. 4.—Murdoch, 1885, p. 153.

*Description.*—Length 25–76 mm., width including setae 9–22 mm. (up to 110 mm. long—Ditlevsen, 1937). Segments 39–41. Body elongated, thick, tapering both anteriorly and posteriorly. Prostomium without cephalic peaks, antennae smooth. Dorsal cirri with fine, scattered, clavate papillae. Elytra smooth, soft, translucent to opaque, not covering middorsum and posterior few segments. Notosetae much stouter than neurosetae, few in number (5–9), light to dark amber-colored, smooth or with only very faint transverse striations. Neurosetae of two kinds: Numerous, long, slender, finely denticled, with capillary tips; few, shorter, with subequal, diverging, forked, blunt tips (one part of fork may be longer than the other). Color: In life and in alcohol: Wide greenish brown to bluish gray transverse stripes middorsally, green and white striped on dorsal tubercles, cirrophores and elytrophores; without color ventrally; elytra light to dark greenish in a wide, circular band, a circular area

and lateral border without color; one specimen (collected October 4, 1949) was noted as peach-colored from segment 10 posteriorly, the color showing mainly on the ventral side and extending into the parapodia (probably developing eggs).

*New records.*—Arctic Alaska: Point Barrow base, washed ashore, 1949 (July 30; August 21; September 22, 28, 30; October 4, 5, 16, 17; 65 specimens); off Point Barrow base, along shore, 1.7 fms., on bottom of gravel with mud (2 specimens). East Coast North America: Off Labrador, 45 fms., *Blue Dolphin* Expedition, 1949.

*Distribution.*—Widely distributed in the Arctic: Siberian and Alaskan Arctic, Davis Strait, Greenland, Spitsbergen, Franz Josef Land, Kara Sea. Also Bering Sea; off Labrador. In 1.7–111 fathoms.

## Genus *Antinoë* Kinberg, 1855 (sensu Malmgren, 1865)

### *Antinoë sarsi* Malmgren, 1865

*Antinoë sarsi* Kinberg, 1862 (MS.), p. 468 (*fide* Malmgren, 1865).—Malmgren, 1865, p. 75, pl. 9, fig. 6 (part).—McIntosh, 1900, p. 365, figs.—Chamberlin, 1920, p. 8.—Hartman, 1944a, p. 334.

*Polynoë sarsi* Théel, 1879, p. 16, pl. 1, fig. 8.—Wirén, 1883, p. 390.—Murdoch, 1885, p. 152.

*Harmothoë sarsi* Eliason, 1920, p. 20.—Annenkova, 1931, p. 203.—Friedrich, 1939, p. 122.—Thorson, 1946, p. 48.—Wesenberg-Lund, 1950a, p. 7; 1950b, p. 23; 1951, p. 17.

*Harmothoë* (*Antinoëlla*) *sarsi* Augener, 1928, p. 687.

*Antinoëlla sarsi* Annenkova, 1937, p. 153; 1938, p. 137.—Gorbunov, 1946, p. 38.—Zatsepin, 1948, p. 107, pl. 28, fig. 8.

*Description.*—Length 21–68 mm., width including setae 11–27 mm. Segments 37 or 38. Fragments easily, posterior segments frequently regenerating. Body elongate, flattened, tapering slightly anteriorly and posteriorly. Prostomium with cephalic peaks distinct or poorly developed; anterior pair of eyes larger than posterior, slightly anterior to greatest width of prostomium. Antennae with short, clavate papillae. Dorsal cirri extending beyond setae, long, slender, tapering gradually, with short, clavate papillae. May be a single anal cirrus, extremely long, thick at base, tapering gradually; may be one long and one short anal cirrus. Elytra large, thin, soft, smooth, with scattered microtubercles and short, delicate, clavate papillae. Lose elytra readily; often show regenerating elytra, thus appearing variable in size. Notopodia and neuropodia extending into conspicuous, digitiform, acicular lobes. Setae yellowish or golden. Notosetae much thicker than neurosetae, large, clear basally; more distally, finely spinous, pointed. Neurosetae of two kinds, with capillary tips and with slender, relatively obtuse, slightly curved tips. Color: In life and preserved: Grayish green or light brown middorsally,

including elytrophores and dorsal tubercles; ventral surface without color or dusky midventrally; elytra gray, translucent to opaque, with a darker brownish-gray medial crescent-shaped area, with a colorless circular area medial to and a darker area posterior to the place of attachment.

*Remarks.*—*A. sarsi* differs from *A. badia* (Théel), with which it has sometimes been confused, by having the neurosetae of two kinds, with capillary tips and with slender, relatively obtuse tips. In *A. badia*, all the neurosetae have capillary tips.

*Parasites.*—One of the 63 specimens had the parasitic copepod *Herpyllobius arcticus* Steenstrup and Lütken attached to the prostomium (identified by P. L. Illg).

*New records.*—Arctic Alaska: Point Barrow base, washed ashore 1949 (August 21, 24; September 1, 12, 20, 22, 24, 26; October 5, 16; 58 specimens); off Point Barrow base, up to 5 miles from shore, 5 to 30.7 fms., on bottoms of mud or stones, and in screen trap through hole in ice, 6 fms., April 11, 1949 (3 stations, 5 specimens); near Point Belcher, Icy Cape, off Point Barrow, Dall. Bering Sea: 62°15′ N., 167°48′ W., 20 fms., G. M. Stoney, 1884. East Coast North America: Off Labrador, 6–30 fms., *Blue Dolphin* Expeditions, 1950, 1951.

*Distribution.*—Widely distributed in the Arctic: Siberian and Alaskan Arctic, Greenland, Jan Mayen, Spitsbergen, Norway, Franz Josef Land, Barents Sea, Novaya Zemlya, Kara Sea. Also Iceland, Faroes to Great Britain, the Baltic; Labrador to Maine; Bering Sea; north Japan Sea. In 3–1,215 fathoms.

## Genus *Eunoë* Malmgren, 1865

### Key to the species of Eunoë from Point Barrow

1. Elytra with scattered, bluntly conical microtubercles only, lacking fringe of papillae. Eyes small, anterior pair anterolateral on prostomium (scarcely visible dorsally) ..... **E. clarki**

   Elytra with macrotubercles in addition to microtubercles, with lateral fringe of papillae. Eyes larger, anterior pair anterodorsal (visible dorsally) ..... 2

2. Body broad, oval, flattened. Extra rounded lobes on inner sides of elytrophores and dorsal tubercles (lobes corresponding to elytrophores on non-elytra-bearing segments, fig. 26, *c*). Nuchal fold posterior to prostomium not prominent. Setae yellow. Elytra with microtubercles rather low, flattened, semiglobose, some bifid; macrotubercles confined essentially to single row near external border, nodular, with roughened tips. Antennae with short papillae ..... **E. nodosa**

   Body more elongate, not so flattened. Without extra rounded lobes on inner sides of elytrophores and dorsal tubercles. Nuchal fold prominent. Setae dark amber-colored. Elytra with microtubercles one- to many-pronged; macrotubercles variable in number, size, and position, branched. Antennae with longer papillae ..... **E. oerstedi**

### *Eunoë clarki* Pettibone, 1951

*Eunoë clarki* Pettibone, 1951, p. 44, fig. 1.

*Description.*—Length 36–38 mm., width including setae 12 mm. Segments 40 or 41. Body linear-oblong, tapered slightly anteriorly and posteriorly. Prostomium without cephalic peaks; anterior pair of eyes anterolateral. Antennae and dorsal cirri with short, clavate papillae. Elytra nearly cover dorsum, with conical microtubercles, without fringe of papillae. Color: In alcohol: Middorsum transversely banded grayish green; elytra greenish gray, with a darker mottled pattern on most of the exposed parts, with a darker spot medial to a lighter area over the elytophore; dorsal cirri with pigmented bands basally and subterminally.

*New record.*—Arctic Alaska: Point Barrow base, washed ashore, October 17, 1949 (2 specimens).

*Distribution.*—Arctic Alaska.

### *Eunoë nodosa* (Sars, 1860)

Figure 26, *c*

*Polynoë nodosa* Sars, 1860, p. 58.

*Eunoë nodosa* Malmgren, 1865, p. 64, pl. 8, fig. 4.—Fauvel, 1923, p. 51, fig. 18, a–e (part).—Annenkova, 1937, p. 149; 1938, p. 134.—Treadwell, 1937, p. 27.—Friedrich, 1939, p. 122.—Berkeley and Berkeley, 1942, p. 187; 1943, p. 129.—Hartman, 1944a, pp. 334, 337.—Gorbunov, 1946, p. 38.—Zatsepin, 1948, p. 107, pl. 28, fig. 7.

*Eunoa nodosa* Malmgren, 1867, p. 6.—Webster and Benedict, 1884, p. 700; 1887, p. 708.—McIntosh, 1900, p. 291, figs.

*Polynoë scabra* Théel, 1879, p. 7.—Wirén, 1883, p. 387, pl. 28, fig. 2; pl. 29, fig. 1 (part; not pl. 28, fig. 1; not *Aphrodita scabra* Fabricius, 1780).

*Polynoë islandica* Hansen, 1882, pp. 17, 24, pl. 1, figs. 15–21.—Murdoch, 1884, p. 152.

*Polynoë arctica* Hansen, 1882, pp. 21, 27, pl. 3, figs. 1–5.

*Polynoë spinulosa* Hansen, 1882, p. 28, pl. 1, figs. 6–10.

*Polynoë foraminifera* Hansen, 1882, pp. 21, 23, 29, pl. 1, figs. 11–14.

*Harmothoë nodosa* Moore, 1902, p. 271.—Ditlevsen, 1917, p. 6, pl. 3, fig. 10 (part; not pl. 2, fig. 1).—Augener, 1928, p. 684 (part).—Wesenberg-Lund, 1950a, p. 6 (part); 1950b, p. 17 (part); 1951, p. 10 (part).

*Eunoë depressa* Hartman, 1948, p. 14 (part; not *E. depressa* Moore, 1905).

*Description.*—Length 13–75 mm., width including setae 7–35 mm. Segments 36 or 37. Prostomium with cephalic peaks short and blunt or lacking; anterior pair of eyes anterolateral, visible dorsally. Antennae with short papillae. Dorsal cirri with long papillae. Body flattened ventrally, strongly arched dorsally, especially in anterior part. With characteristic bulbous structures on inner sides of bases of elytrophores and dorsal tubercles. Segmental papillae quite elongate, cylindrical, directed dorsally between the parapodia. Elytra with fringe of long papillae on external border. Elytral microtubercles numerous, close-set, rather low, flattened, semiglobose, some bifid;

macrotubercles confined mostly to a single row near external border, dark colored to pale yellow, nodular, with roughened tips or a fasicle of short spikes. Elytra often covered with a good deal of debris and foreign material. COLOR: In life and in alcohol: Mediodorsal surface colorless or banded with olive-brown between elytrophores and dorsal tubercles; ventral surface without color or olive-brown; setae yellow or light amber-colored; elytra yellow or tannish mottled with reddish brown.

*Remarks.*—*Eunoë nodosa* has been confused with *E. oerstedi*. The two species have been separated by Sars (1860), Malmgren (1865), Verrill (1881), Murdoch and Benedict (1885, as *Polynoë islandica* and *P. scabra*), and Treadwell (1937). They have been considered to be synonymous and a highly variable species by Théel (1879), Wirén (1883), Fauvel (1923), Ditlevsen (1917), Augener (1928), and Wesenberg-Lund (1950a, b). Based on a study of the material from Point Barrow as well as numerous other specimens in the U. S. National Museum from Greenland and off New England, the two species appear to be separable on the basis of a number of characters as indicated in the key. They agree in having the prostomium with cephalic peaks short and blunt or lacking, the position of the eyes, the dorsal cirri with long papillae, and the palps each with six longitudinal rows of papillae.

*New records.*—ARCTIC ALASKA: Eluitkak Pass, Elson Lagoon near Point Barrow, stony-mud; off Point Barrow base, up to 12.1 miles from shore, 18.3–87 fathoms, on various combinations of mud, stones, pebbles, gravel, rocks (14 stations, 33 specimens). BERING SEA: 57° N., 163° 48′ W., 38 fms., Alaska King Crab Expedition (Hartman (1948), as *E. depressa*); *Albatross* Sta. 3252, 57°22′ N., 164°24′ W., 29.5 fms., black mud, 1890, and Sta. 3512, 57°49′ N., 169°27′ W., 38 fms., 1893. SOUTHWESTERN ALASKA: Belkofsky Bay, 15–25 fms., Dall, 1880. FRANZ JOSEF LAND: Aberdore Channel, east Alger Island, 10 fms., Baldwin-Ziegler Expedition, 1901. EAST COAST NORTH AMERICA: Off Labrador, 10–95 fms., *Blue Dolphin* Expeditions, 1949, 1950; *Albatross* Sta. 2432, off Newfoundland, 43°04′ N., 50°45′ W., 64 fms., 1885; Bay of Fundy, Grand Manan, Nova Scotia, Maine, Massachusetts, 16–120 fms., U. S. Fish Commission.

*Distribution.*—Widely distributed in the Arctic: Siberian, Alaskan, and Canadian Arctic, Baffin Bay, Davis Strait, Greenland, Jan Mayen, Spitsbergen, Norway, Franz Josef Land, Barents Sea, Novaya Zemlya, Kara Sea. Also Bering Sea; north Japan Sea; Iceland, Faroes, Shetlands to English Channel; Hudson Bay to Massachusetts. In 10–690 fathoms.

***Eunoë oerstedi* Malmgren, 1865**

FIGURE 26, *d*

*Lepidonote scabra* Oersted, 1843, p. 164, pl. 1, figs. 2, 7, 10, 12–13, 17–18 (not *Aphrodita scabra* Fabricius, 1780).

*Polynoë scabra* Sars, 1860, p. 58.—Hansen, 1882, p. 11.—Wirén, 1883, p. 387, pl. 28, fig. 1 (part).—Murdoch, 1885, p. 152 (not *A. scabra* Fabricius, 1780).

*Eunoë oerstedi* Malmgren, 1865, p. 61, pl. 8, fig. 3.—Moore, 1909b, p. 135.—Sumner, 1913, p. 618.—Treadwell, 1937, p. 27.—Hartman, 1944a, pp. 334, 337.—Gorbunov, 1946, p. 38.—Pettibone, 1953, p. 46, pl. 23.

*Eunoë barbata* Moore, 1910, p. 334, pl. 28, figs. 1–6.—Treadwell, 1925, p. 1.—Hartman, 1939, p. 53.—Berkeley and Berkeley, 1945, p. 321; 1948, p. 14, fig. 16.—Pettibone, 1949, p. 2.

*Eunoë nodosa* Fauvel, 1923, p. 51, fig. 18, a–e (part).—Hartman and Reish, 1950, p. 7 (not *Polynoë nodosa* Sars, 1860).

*Harmothoë nodosa* Ditlevsen, 1917, p. 6, pl. 2, fig. 1 (part; not pl. 3, fig. 10).—Augener, 1928, p. 684 (part).—Wesenberg-Lund, 1950a, p. 6 (part); 1950b, p. 17 (part); 1951, p. 10 (part; not *P. nodosa* Sars, 1860).

*Description.*—Length 18–73 mm., width including setae 6–29 mm. Segments 37–39 (39–42 in specimens from Washington). Prostomium with cephalic peaks poorly developed or lacking; anterior pair of eyes anterolateral, visible dorsally. Antennae and dorsal cirri with long papillae. Body elongate, oval in cross section. Segmental papillae short and bulbous. Tips of notosetae may be worn down and blunt, especially in larger specimens. Elytra with lateral fringe of papillae. Elytral surface exceedingly scabrous, with microtubercles one- to many-pronged; macrotubercles branched, extremely variable in size, number, arrangement and shape; some brownish, some translucent. COLOR: In alcohol: Dusky, dark or greenish black between elytrophores and dorsal tubercles, with some color on cirrophores of dorsal cirri and tips of parapodia; setae dark amber-colored.

*Remarks.*—This species is closely related to and has been confused with *E. nodosa* as discussed above. Examination of the type of *E. barbata* Moore from central California revealed no essential differences from *E. oerstedi*.

*New records.*—ARCTIC ALASKA: Eluitkak Pass, Elson Lagoon near Point Barrow, 6.6 fms.; off Point Barrow base, up to 8 miles from shore, 18.3 to 75.5 fms., on bottoms of mud, sand, shells, pebbles, gravel, rocks, stones (10 stations, 20 specimens). CANADIAN ARCTIC: Baffin Island, 66°43′ N., 80°07′ W., 1927; center, south, and southeast corner Foxe Basin, 25–37 fms., 1927; Kneeland Bay in Frobisher Bay, Baffin Island, 7–12 fms., 1942; all collected by Bartlett. WEST GREENLAND: Murchison Sound, 45–60 fms., Bartlett, 1938. EAST GREENLAND: Clavering Fiord, 1939; off Cape Hold with Hope, 23–40 fms., Bartlett, 1939. SOUTH GREENLAND: Off Cape Farewell, 70 fms., Bartlett, 1939. EAST COAST NORTH AMERICA: Off Labrador,

25–40 fms., *Blue Dolphin* Expeditions, 1949, 1950; Nova Scotia, Grand Manan, Maine, Massachusetts, low water to 110 fms., U. S. Fish Commission. JAPAN: *Albatross* Sta. 3656, Hakodate Bay, 11.5 fms., 1896.

*Distribution.*—Widely distributed in the Arctic: Siberian, Alaskan and Canadian Arctic, Baffin Bay, Davis Strait, Greenland, Spitsbergen. Also from Norway to English Channel; Labrador to Massachusetts; Bering Sea to central California; and Japan. In low water to 516 fathoms.

## Genus *Harmothoë* Kinberg, 1857

As used herein, *Harmothoë* includes *Lagisca* Malmgren, 1865; *Evarne* Malmgren, 1865; and *Evarnella* Chamberlin, 1919.

Both species represented have the body short, attenuated posteriorly, segments about 40 (36–50), covered by elytra except for posterior few segments; elytra with numerous conical microtubercles. Prostomium with cephalic peaks prominent (fig. 26, *a*). Antennae and dorsal cirri with short papillae. Notosetae stouter than neurosetae, with long distal spinous regions and short, pointed, bare tips.

### Key to the species of Harmothoë from Point Barrow

1. Anterior pair of eyes anteroventral on prostomium (slightly posterior and lateral to cephalic peaks), not visible dorsally (fig. 26, *a*). Elytra with or without large, globular macrotubercles near posterior border.
**H. imbricata**

Anterior pair of eyes anterolateral on prostomium, visible dorsally. Elytra with macrotubercles globular, sausage-shaped or elongate, rodlike.
**H. extenuata**

### *Harmothoë imbricata* (Linné, 1767)

FIGURE 26, *a*, *e*

*Aphrodita imbricata* Linné, 1767, p. 1804.
*Lepidonote cirrata* Oersted, 1843, p. 166, pl. 1, figs. 1, 5–6, 11, 14–15.
*Polynoë cirrata* Sars, 1860, p. 60.
*Harmothoë imbricata* Malmgren, 1865, p. 66, pl. 9, fig. 8.—Webster and Benedict, 1884, p. 701; 1887, p. 709.—Johnson, 1897, p. 181; 1901, p. 390.—McIntosh, 1900, p. 314, figs.—Moore, 1902, p. 270; 1903, p. 402; 1908, p. 334.—Ditlevsen, 1909, p. 7, pl. 2, fig. 5.—Sumner, 1913, p. 617.—Southern, 1914, p. 52.—Chamberlin, 1920, p. 4.—Eliason, 1920, p. 19.—Fauvel, 1923, p. 55, fig. 18, f–e; 1933, p. 10; 1936, p. 50.—Treadwell, 1925, p. 1; 1937, p. 26.—Augener, 1928, p. 677; 1939, p. 133.—Annenkova, 1934, p. 322; 1937, p. 151; 1938, p. 136.—Okuda, 1938b, p. 83; 1939, p. 224.—Friedrich, 1939, p. 122.—Monro, 1939a, p. 345.—Hartman, 1944a, pp. 335, 337; 1948, p. 13.—Thorson, 1946, p. 46, figs. 17–18.—Gorbunov, 1946, p. 38.—Zatsepin, 1948, p. 108, pl. 28, fig. 10.—Berkeley and Berkeley, 1948, p. 11, fig. 9.—Pettibone, 1949, p. 2; 1953, p. 32, pls. 13–16.—Hartman and Reish, 1950, p. 6.—Wesenberg-Lund, 1950a, p. 6; 1950b, p. 18; 1951, p. 12.

*Polynoë imbricata* Marenzeller, 1879, p. 9, pl. 2, fig. 1.—Théel, 1879, p. 9.—Hansen, 1882, pp. 11, 13, 15, 23.—Wirèn, 1883, p. 389.
*Harmothoë levis* Treadwell, 1937, p. 26, figs. 1–5.

*Description.*—Length 24–53 mm., width including setae 8–19 mm. (length up to 65 mm.—Thèel, 1879). Segments 37–39. Prostomium with anterior pair eyes ventral, slightly posterior and lateral to cephalic peaks. Elytra with scattered conical microtubercles, with or without few to numerous, small, brownish to reddish, globular to elongate cylindrical macrotubercles in one, two, or several irregular rows near posterior border; may be a few additional globular papillae in middle of elytra; with or without short elytral fringe of papillae. Neurosetae with long spinous regions, with long, bare, hooked tips, and usually with a subterminal tooth (may be broken off). Color: In life and in alcohol: Irregularly pigmented middorsally, on cirrophores, dorsal tubercles, and parapodial lobes; usually without color ventrally; elytra show remarkable color variations of mottled tan and brown, blackish to grayish, or reddish; inner halves of elytra red or grayish brown resulting in a middorsal, longitudinal, pigmented band; uniformly tan; tan with bilateral darker spots near places of attachment (the color variety of *H. levis* Treadwell).

*Remarks.*—Examination of the types of *H. levis* Treadwell from Greenland waters revealed it to be but a color variation of *H. imbricata.*

*Parasites.*—Of the 215 specimens, 13 had parasitic copepods, *Herpyllobius arcticus* Steenstrup and Lütken, attached on the prostomium (identified by Paul L. Illg).

*New records.*—Arctic Alaska: Eluitkak Pass, Elson Lagoon near Point Barrow, 6.6 fms., gravel, stones, mud; Point Barrow base, washed ashore; off Point Barrow base, up to 16 miles from shore, 11.7–123.5 fms., on bottoms of stones, mud, masses of worm tubes, and various combinations of mud, pebbles, gravel, stones, large perforated rocks, with barnacles, bryozoans, hydroids, tunicates, shells, worm tubes (34 stations, 215 specimens). Canadian Artic: Southeast corner Foxe Basin, 66°46′ N., 79°15′ W., 34–37 fms., 1927; shoal in Kneeland Bay, Frobisher Bay, Baffin Island, 7–12 fms., 1942; west shore Frobisher Bay, 1942; off Daniels Island, northwest side in Newell Sound, Frobisher Bay, 10–30 fms., 1942; all collected by Bartlett. West Greenland: Oelricks Bay, mud, 1937; Vaigat, Disko Island, mud, 1937; between Capes Alexander and Chalon, 25–40 fms., rocks, 1937; Walrus grounds, Murchison Sound, 45–60 fms., 1938; off Conical Rock, 76° N., 67°30′ W., 20–40 fms., rocks, shell, 1938; all collected by Bartlett. Upernivik Harbor, 13 fms., U.S.S. *Alert,* 1884. East Greenland: Clavering Fiord, 1939; Angmogssalik, 10–15 fms., 1939; off Cape Hold with Hope, 23–40 fms., 1939; all collected by Bartlett. Spitsbergen: Spitsbergen Sea,

U.S.S. *Alliance*, 1881; South Gatt, northwest Spitsbergen, 79°40′ N., 7 fms., E. Wilkinson. East Coast North America: Off Labrador and Newfoundland, intertidal to 60 fms., *Blue Dolphin* Expeditions, 1949, 1950, 1951; off Nova Scotia, Grand Manan, Maine, Massachusetts, Rhode Island, Long Island Sound, intertidal to 110 fms., U. S. Fish Commission. Bering Sea: Bering Strait, 13 fms., Dall, 1880; 62°54′ N., 166°38′ W., 22 fms., and 66°12′ N., 168°54′ W., Stoney, 1884; St. George Island, Pribilofs, G. D. Hanna, 1914; *Albatross* Sta. 3252, 57°22′ N., 164°24′ W., 29.5 fms., 1890, and Sta. 3522, 57°58′ N., 170°09′ W., 41 fms., 1893. Southwestern Alaska: Bay of Islands, Adak Island, 9–16 fms., 1873, and Coal Harbor, Unga Island, 1872, Dall. Southeastern Alaska: Wrangel, W. H. Jones. Sitka, "worm-eaten" wood, L. A. Beardslee. Japan: *Albatross* Sta. 3656, Hakodate Bay, 1896.

*Distribution.*—Widely distributed in the Arctic: Siberian, Alaskan, and Canadian Arctic, Davis Strait, Greenland, Jan Mayen, Spitsbergen, Franz Josef Land, Barents Sea, Novaya Zemlya. Also Iceland and Norway to Mediterranean and Adriatic; Labrador to New Jersey; Bering Sea to southern California; and Japan. In low water to 2,030 fathoms.

***Harmothoë extenuata* (Grube, 1840)**

*Polynoë extenuata* Grube, 1840, p. 86 (*fide* Claparède, 1868).—Claparède, 1868, p. 380, pl. 2, fig. 2.

*Polynoë rarispina* Sars, 1860, p. 60.—Théel, 1879, p. 8.—Hansen, 1882, p. 7.—Wirén, 1883, p. 389.

*Lagisca rarispina* Malmgren, 1865, p. 65, pl. 8, fig. 2.—Verrill, 1881, pp. 311, 314.—Webster and Benedict, 1884, p. 700; 1887, p. 709.—Moore, 1902, p. 269; 1908, p. 335.—Fauvel, 1911, p. 9; 1914, p. 65.—Chamberlin, 1920, p. 5.—Berkeley and Berkeley, 1943, p. 129; 1948, p. 16, figs. 18, 19.

*Lagisca propinqua* Malmgren, 1867, p. 9, pl. 1, fig. 3, a–e.

*Lagisca extenuata* Marenzeller, 1876, p. 133, pl. 1, fig. 1; 1904, p. 318.—McIntosh, 1900, p. 307, figs.—Fauvel, 1923, p. 76, fig. 28, a–m; 1934a, p. 14.—Monro, 1939a, p. 345.—Wesenberg-Lund, 1939a, p. 6, fig. 2; 1950a, p. 8; 1950b, p. 27; 1951, p. 18.

*Lagisca impatiens* Webster, 1879b, p. 102; 1886, p. 129, pl. 4, figs. 1–7.

*Polynoë semisculpta* Hansen, 1882, p. 26, pl. 3, figs. 16–20 (*?P. semisculptus* Johnston, 1865).

*Lagisca floccosa* McIntosh, 1900, p. 298, figs.—Southern, 1914, p. 51 (not *Polynoë floccosa* Savigny, 1820).

*Harmothoë extenuata* Alaejos y Sanz, 1905, p. 55, pl. 9, fig. 8; pl. 10, figs. 1–12; pl. 11, fig. 1.—Ehlers, 1913, p. 446.—Pettibone, 1953, p. 31.

*Harmothoë rarispina* Ditlevsen, 1909, p. 5, pl. 1, figs. 2–4; 1937, p. 11.—Augener, 1928, p. 685.—Annenkova, 1937, p. 153; 1938, p. 136.—Friedrich, 1939, p. 122.—Gorbunov, 1946, p. 38.—Zatsepin, 1948, p. 108, pl. 28, fig. 15.

*Harmothoë triannulata* Moore, 1910, p. 346, pl. 29, figs. 18–22.—Hartman, 1938a, p. 118.—Berkeley and Berkeley, 1948, p. 12, fig. 10.

*Lagisca extenuata* var. *spinulosa* Fauvel, 1914, p. 64, pl. 4, figs. 27–29.

*Harmothoë propinqua* Ditlevsen, 1917, p. 14, pl. 3, figs. 1, 3.

*Harmothoë rarispina* forma *propinqua* Annenkova, 1937, p. 153; 1938, p. 137.

*Evarnella triannulata* Berkeley and Berkeley, 1942, p. 188; 1943, p. 130.—Hartman, 1948, p. 13 (part; includes *H. multisetosa* Moore and *H. extenuata*).—Pettibone, 1949, p. 1.

*Description.*—Length 13–68 mm., width including setae 4–20 mm. (length up to 74 mm.—Ditlevsen, 1937). Segments 37–47. Prostomium with eyes large, anterior pair anterolateral, slightly anterior to widest part of prostomium, visible dorsally. Neurosetae with enlarged, long spinous regions, with tips slightly hooked, with small, secondary tooth present or absent; at least some of the setae show a remnant of a secondary tooth. The upper and lower neurosetae tend to be unidentate (not always) while the middle ones are bidentate, with a secondary tooth or remnant of it (in specimens from Woods Hole region only a few neurosetae have a secondary tooth or remnant of one). Elytra with numerous microtubercles, more or less uniform in size, conical, with tips blunt, pointed, or bifid; usually with few to fairly numerous macrotubercles distinctly set off from elytral surface, usually narrower at the base, brown, smooth, globular, sausage-shaped, or elongate fusiform, variable in number, 0–9 near posterior border, 0–13 scattered near center of elytron. Elytra with short fringe of papillae on external border. Color: In alcohol: Without color anteriorly; on posterior half, with brownish transverse bands and two brown spots basally on cirrophores (in specimens from Woods Hole region, found intertidally, the body is darkly pigmented grayish-green middorsally); antennae and dorsal cirri ringed with brown; elytra mottled with brown, sometimes with a darker spot posterior and medial to the place of attachment; the microtubercles may be covered with a brown extraneous material, giving a streaked appearance.

*Remarks.*—*H. extenuata* is an extremely variable species as indicated by the number of names that have been applied to it. It reaches its greatest size in arctic waters; it is small when found intertidally, as in the Puget Sound region (up to 23 mm.—*H. triannulata* of Moore). When found intertidally off New England, it also is small (about 26 mm.), and the secondary tooth of the neurosetae is suppressed, usually with only a remnant showing on a few neurosetae, the rest being entire (*L. impatiens* of Webster). In the collection from Point Barrow, where it was the most abundant polychaete, it is represented by specimens of all sizes from very small to large (up to 68 mm.).

*Parasites.*—Of the 375 specimens, 3 had the parasitic copepod *Herpyllobius arcticus* Steenstrup and Lutken attached to the prostomium (identified by Illg).

*New records.*—Arctic Alaska: Eluitkak Pass, Elson Lagoon near Point Barrow, 6.6 fms.; off Point Barrow base, up to 15 miles from shore, 13.3–123.5 fms., on bottoms of mud, stones, masses of worm tubes, and various combinations of mud, pebbles, rocks, gravel, stones, large perforated rocks, with shells, bryozoans, hydroids,

worm tubes, from starfish and crab, *Hyas coarctatus* (37 stations, 375 specimens). CANADIAN ARCTIC: Foxe Basin, 66°30′ N., 80° W., 1927; center Foxe Basin, 25–31 fms., 1927; 7 miles east Cape Dorchester, Foxe Channel, 25 fms., 1927; Baffin Island, 66°43′ N., 80°07′ W., 1927; Hurd Channel between Bushman Island and Melville Peninsula, 11 fms., rocky, 1933; south end Cape Martineau, Melville Peninsula, 7–15 fms., 1933; 3 miles south Salisbury Island, Hudson Strait, 27 fms., 1933; south end Cobourg Island, Baffin Bay, 75°40′ N., 78°58′ W., 11.3–20 fms., 1935; east end Cobourg Island, 75°40′ N., 78°50′ W., 23–36 fms., 1935; southeast corner Foxe Basin, 66°46′ N., 79°15′ W., 34–37 fms., 1937; Kneeland Bay, Frobisher Bay, Baffin Island, 7–12 fms., 1942; all collected by Bartlett. WEST GREENLAND: Vaigat, Disko Island, mud, 1937; between Capes Alexander and Chalon, 25–40 fms., rocky, 1937; Walrus grounds, Murchison Sound, 45 fms., 1938; all collected by Bartlett. NORTH GREENLAND: North Omenolu near North Star Bay, 17 fms., and Cape Alexander, entrance to Smith Sound, rocky, 1932, Bartlett. EAST GREENLAND: Off Cape Hold with Hope, 23–40 fms., Bartlett, 1939. SOUTH GREENLAND: Cape Farewell, 70 fms., Bartlett, 1939. FRANZ JOSEF LAND: Aberdore Channel east Alger Island, 10 fms., Baldwin-Ziegler Polar Expedition, 1901. BERING SEA: Alaska King Crab Investigation, 1941, Sta. D8–41, 58°34′ N., 165°17′ W., 42 fms.; Sta. D7–41, 57° N., 163°48′ W., 38 fms.; Sta. D11–41, 12 miles east Walrus Island, Pribilofs, 31–33 fms.; St. George Island, Pribilofs, village beach, 1914, and St. Paul Island, Pribilofs, 1915, Hanna; 62°54′ N., 166°38′ W., 22 fms., and 62°15′ N., 167°48′ W., 20 fms., Stoney, 1884. SOUTHWESTERN ALASKA: Alaska King Crab Investigation, 1940, 1941, Sta.: 89–40, Unga Strait, 37–47 fms.; 93–40, Spitz Island, 55–68 fms.; Sand Point; 128–40, Shelikof Strait off Hallo Bay, 35–48 fms.; 60–40, Lenard Harbor, 20–25 fms.; L18–41, Kupreanof Strait, south side, 2 miles northwest Bare Island, 13–15 fms.; 72–40, Cold Bay, 15–50 fms.; 52–40, Canoe Bay, 35–40 fms., on *Paralithodes camtschatica*; 100–40, Alitak Bay, 30 fms.; 59–40, between inner Iliasik and Goloi Island, 20–30 fms. SOUTHEASTERN ALASKA: Lituya Bay, 6–9 fms., Dall, 1874. EAST COAST NORTH AMERICA: Off Labrador, 6–100 fms., *Blue Dolphin* Expeditions, 1949, 1950, 1951; Bay of Fundy, Gulf of Maine, Massachusetts, Long Island Sound, 4–134 fms., U. S. Fish Commission; Woods Hole region, intertidal and dredged, Pettibone, 1950, 1951; *Fish Hawk* Sta. 8826, 8898, Chesapeake Bay, 1920.

*Distribution.*—Widely distributed in the Arctic: Siberian, Alaskan, and Canadian Arctic, Baffin Bay, Davis Strait, Greenland, Spitsbergen, Franz Josef Land, Novaya Zemlya, Kara Sea. Also Iceland, Faroes, Norway to Mediterranean and Adriatic; Hudson Bay to Chesapeake Bay; Bering Sea to southern California; north Japan Sea; South Africa. In low water to 1,000 fathoms.

## Genus *Enipo* Malmgren, 1865, sensu Levinsen, 1883

### *Enipo gracilis* Verrill, 1874

*Enipo gracilis* Verrill, 1874a, pp. 407, 411, pl. 6, fig. 4; 1874b, pp. 347, 361, 378, pl. 5, fig. 3.—Pettibone, 1953, p. 22, pl. 7.
*Enipo cirrata* Treadwell, 1925, p. 1, figs. 1–4.—Hartman, 1938a, p. 120, fig. 39, d, e.—Berkeley and Berkeley, 1942, p. 188; 1945, p. 322; 1948, p. 16, fig. 20.
*Polynoë gracilis* Hartman, 1942a, p. 26, figs. 23–26.

*Description.*—Length 25–76 mm., width including setae 3–4 mm. Segments variable in number (45, with regenerating posterior end, to 74). Body elongate, slender, with sides nearly parallel. Prostomium without cephalic peaks. In some specimens from New England there are slight prostomial peaks (prostomial peaks present—Hartman, 1942). Antennae and dorsal cirri with short, clavate papillae. Dorsal cirri short, barely reaching tips of setae in anterior part, longer in posterior region without elytra. Elytra oval, translucent, small, usually leaving middorsum uncovered, smooth, without papillae or tubercles. Notosetae form a short, bushy bundle, rather numerous (more than 30 in specimens from Point Barrow) to few (2–20 or rarely 0—Treadwell, 1925), slender to moderately stout, tapering gradually to short, bare, blunt tips, with spinous rows distally. Neurosetae stouter than notosetae, upper ones with longer spinous regions (17–23 or so rows), middle ones with shorter spinous regions (10 or so rows), with long, bare, slightly hooked tips (neurosetae may be all similar, with 5–10 transverse spinous rows). Color: In alcohol: Without color or brownish middorsally; elytra pigmented smoky brown on the medial halves.

*Remarks.*—Known to be commensal with the maldanid *Nicomache lumbricalis* (Fabricius) in Alaska (as *E. cirrata*—Berkeley and Berkeley, 1942) and off Halifax, Nova Scotia, and Cape Cod (specimens in the U. S. National Museum, identified by Verrill).

*New Records.*—Arctic Alaska: Off Point Barrow, up to 12.1 miles from shore, 21–123.5 fms., from breaking rock, masses of worm tubes, with stones, large perforated rocks (3 stations, 3 specimens). East Coast North America: Off Nova Scotia, Maine, Massachusetts, 2–198 fms., U. S. Fish Commission.

*Distribution.*—Alaskan Arctic; southwestern Alaska to Washington; Nova Scotia to Massachusetts. In 2–123.5 fathoms.

## Genus *Arcteobia* Annenkova, 1934

### *Arcteobia anticostiensis* (McIntosh, 1874)

*Eupolynoë anticostiensis* McIntosh, 1874, p. 265, pl. 10, figs. 1–4.—Wirén, 1883, p. 390, pl. 29, fig. 2.—Marenzeller, 1890, pl. 1.
*Harmothoë anticostiensis* Augener, 1928, p. 691, pl. 11, fig. 13.

*Arcteobia anticostiensis* Annenkova, 1934, p. 322; 1937, p. 149, pl. 3, figs. 26, 27; 1938, p. 133.
*Eucranta anticostiensis* Hartman, 1944a, p. 337.

*Description.*—Length 11–26 mm., width including setae 4–8 mm. Segments 35 or 36. Prostomium with distinct cephalic peaks; anterior pair of eyes anteroventral, not visible dorsally. Antennae and dorsal cirri with short, clavate papillae. Elytral pairs get larger posteriorly, the last pair usually extending beyond end of body. Elytra without fringe of papillae, smooth except for scattered microtubercles on anterior curved part. Upper notosetae shorter, stouter, with short, blunt to sharp-pointed tips; most of notosetae more slender, with capillary tips. Few upper neurosetae longer, ending in sharp, slender tips; most of neurosetae with bifid tips. Color: In life and in alcohol: Irregularly banded middorsally, greenish to greenish black, with a transverse stripe and often a pair of small spots; elytra with reddish brown pigmented area, usually C-shaped on inner and posterior parts and often a darker spot over place of attachment; may form a complete, circular, colored area.

*Remarks.*—Probably commensal in habit; off Labrador, found commensal in the sinuous tubes of the terebellid *Pista flexuosa* (Grube), one worm per tube.

*New records.*—Arctic Alaska: Point Barrow base, washed ashore; off Point Barrow base, up to 12.1 miles from shore, 24.7–123.5 fms., on bottoms of mud, masses of worm tubes, and various combinations of mud, gravel, stones, rocks, and large perforated rocks (7 stations, 14 specimens). East Coast North America: Off Labrador, 40–95 fms., *Blue Dolphin* Expedition, 1949; off Nova Scotia, Maine, Massachusetts, 10–86 fms., U. S. Fish Commission.

*Distribution.*—Alaskan Arctic; Labrador to Massachusetts; Bering Sea; north Japan Sea. In low water to 123.5 fathoms.

## Genus *Gattyana* McIntosh, 1897

### Key to the species of Gattyana from Point Barrow

1. Notosetae with tips blunt to capillary. Anterior pair of eyes anteroventral, not visible dorsally; cephalic peaks distinct. Elytra with microtubercles only ..... **G. cirrosa**
   All notosetae with capillary tips. Anterior pair of eyes anterolateral; cephalic peaks short and blunt. Elytra with conical and bifid microtubercles, with a few larger, knoblike macrotubercles ..... **G. ciliata**

### *Gattyana cirrosa* (Pallas, 1766)

Figure 26, *b*

*Aphrodita cirrhosa* Pallas, 1766, p. 95, pl. 8, figs. 3–6.
*Nychia cirrosa* Malmgren, 1865, p. 58, pl. 8, fig. 1.—Théel, 1879, p. 7.—Verrill, 1881, pp. 306, 311.—Wirén, 1883, p. 387.—Webster and Benedict, 1884, p. 700; 1887, p. 708.—? Andrews, 1891, p. 279.

*Gattyana cirrosa* McIntosh, 1900, p. 285, figs.—Moore, 1902, p. 259; 1908, p. 337.—Southern, 1914, p. 51.—Eliason, 1920, p. 21.—Fauvel, 1923, p. 49, fig. 17, a–g.—Augener, 1928, p. 692; 1939, p. 136.—Gustafson, 1936, p. 5.—Treadwell, 1937, p. 25.—Annenkova, 1937, p. 148; 1938, pp. 83, 96, 133, 222.—Monro, 1939a, p. 345.—Berkeley and Berkeley, 1943, p. 129; 1948, p. 13, fig. 13.—Thorson, 1946, p. 45.—Gorbunov, 1946, p. 38.—Hartman, 1948, p. 14.—Zatsepin, 1948, p. 106, pl. 28, fig. 5.—Pettibone, 1949, p. 2; 1953, p. 41, pl. 20.—Wesenberg-Lund, 1950a, p. 5, pl. 1, figs. 1, 2; 1950b, p. 12; 1951, p. 9.

*Gattyana cirrhosa* Chamberlin, 1920, p. 8.

*Description.*—Length 11–35 mm., width including setae 4–12 mm. Segments 35–38. Elytra with long papillae on posterior and external borders as well as scattered over the exposed part of elytral surface, usually covered with debris, giving a straggly appearance. Elytral tubercles amber-colored, exceedingly variable in shape, conical or cylindrical, simple, bifid or quadrifid, showing various degrees of being worn down; tubercles on the anterior few pairs of elytra tend to be less worn down, showing their more characteristic shapes. Color: In alcohol: Elytra tan mottled with brown or uniformly tan; often with blackish foreign material on elytral tubercles and papillae. Specimens washed ashore were essentially free from debris, the elytra whitish, iridescent, with amber-colored tubercles and inconspicuous, delicate papillae.

*Parasites.*—Three of the 126 specimens had the parasitic copepod *Herpyllobius arcticus* Steenstrup and Lütken attached to the prostomia (identified by Illg).

*New records.*—Arctic Alaska: Eluitkak Pass, Elson Lagoon near Point Barrow, 6.6 fms.; Point Barrow base, washed ashore; off Point Barrow base, up to 15 miles from shore, 18.3–123.5 fms., on bottoms of mud, stones, masses of worm tubes, and various combinations of mud, pebbles, small and large rocks, stones, gravel, and worm tubes; from breaking rock (30 stations, 126 specimens). Cape Smyth, 2.5–3 fms., Point Barrow Expedition, 1883. Canadian Arctic: South end Cape Martineau, Melville Peninsula, 7–15 fms., 1933; Foxe Basin, 1933; east end Cobourg Island, Baffin Bay, 75°40′ N., 78°50′ W., 23–40 fms., 1935; Kneeland Bay, Frobisher Bay, Baffin Island, 14 fms., 1942; all collected by Bartlett. West Greenland: Vaigat, Disko Island, 1937; between Capes Alexander and Chalon, 25–40 fms., rocky, 1937; Walrus grounds, Murchison Sound, 60 fms., 1938; northwest Conical Rock, 1938; all collected by Bartlett. Upernivik Harbor, 13 fms., and Godhavn, U. S. S. *Alert*, 1884. East Greenland: Off Cape Hold with Hope, 4–6 fms., Bartlett, 1939. North Greenland: North Omenolu near North Star Bay, 17 fms., Bartlett, 1932. Spitsbergen: Spitsbergen Sea, U. S. S. *Alliance*, 1881. Bering Sea: Bering Strait, 13 fms., Dall, 1880. *Albatross* Sta. 3326, 53°40′

N., 167°41′ W., 1890. Southwestern Alaska: Iluiliuk Harbor, Unalaska, Dall, 1871. Southeastern Alaska: Sitka, Dall. East Coast North America: Off Labrador, 13–125 fms., *Blue Dolphin* Expeditions, 1949, 1950, 1951.

*Distribution.*—Widely distributed in the Arctic: Siberian, Alaskan, and Canadian Arctic, Davis Strait, Greenland, Spitsbergen, Novaya Zemlya. Also Iceland, Faroes, Norway to France; Hudson Bay to Massachusetts; Bering Sea to Washington; north Japan Sea. In low water to 630 fathoms.

### *Gattyana ciliata* Moore, 1902

*Gattyana ciliata* Moore, 1902, p. 263, pl. 13, figs. 14–19; pl. 14, fig. 20; 1905a, p. 525; 1908, p. 337.—Annenkova, 1937, p. 148, pl. 2, figs. 9, 11; pl. 4, fig. 33; 1938, pp. 83, 100, 132, 224.—Berkeley and Berkeley, 1948, p. 12, fig. 11.—Pettibone, 1953, p. 40, pl. 19.

*Description.*—Length 63–65 mm., width including setae 25–29 mm. (length up to 80 mm.—Annenkova, 1937). Segments 36 or 37. Cephalic peaks lacking or short and blunt. Elytral tubercles of several kinds: Microtubercles numerous, conical, pointed, hooked, some bifid; usually intermediate-sized tubercles elongated, conical, some bifid, in several rows arranged diagonally from center of elytron laterally; conical macrotubercles with blunt, roughened tips, usually near posterior border of elytra, variable in number, size, and shape. Color: In alcohol: Elytra tannish mottled with brown.

*New records.*—Arctic Alaska: Off Point Barrow base, up to 12.1 miles from shore, 20–87 fms., on bottoms of rocks, stones, small amount of gravel (4 stations, 4 specimens). Bering Sea: *Albatross* Sta. 3606, 55°27′ N., 167°47′ W., 87 fms., green mud, fine sand, 1895.

*Distribution.*—Alaskan Arctic (originally recorded from Greenland waters, corrected to Icy Cape, Alaska—Moore, 1902, 1905); Bering Sea to Washington; north Japan Sea. In 4.4–303 fathoms.

## Family Sigalionidae

Prostomium subglobular, with two pairs of eyes, dorsal antennae 1–3, a pair of subulate, ventral palps (fig. 26, *f*). First or tentacular segment with or without numerous setae (lacking in *Pholoë*), with two pairs of tentacular cirri. Parapodia biramous, with notosetae simple, neurosetae simple or composite or both; with paired dorsal elytra on certain segments; without dorsal cirri; with paired subulate ventral cirri. Pygidium with pair of anal cirri. With or without cirriform branchiae and ciliated cushions or ctenidia on parapodia (both lacking in *Pholoë*). Muscular proboscis eversible, with circle of soft marginal papillae and two pairs of interlocking, chitinous jaws.

Represented by a single species from Point Barrow.

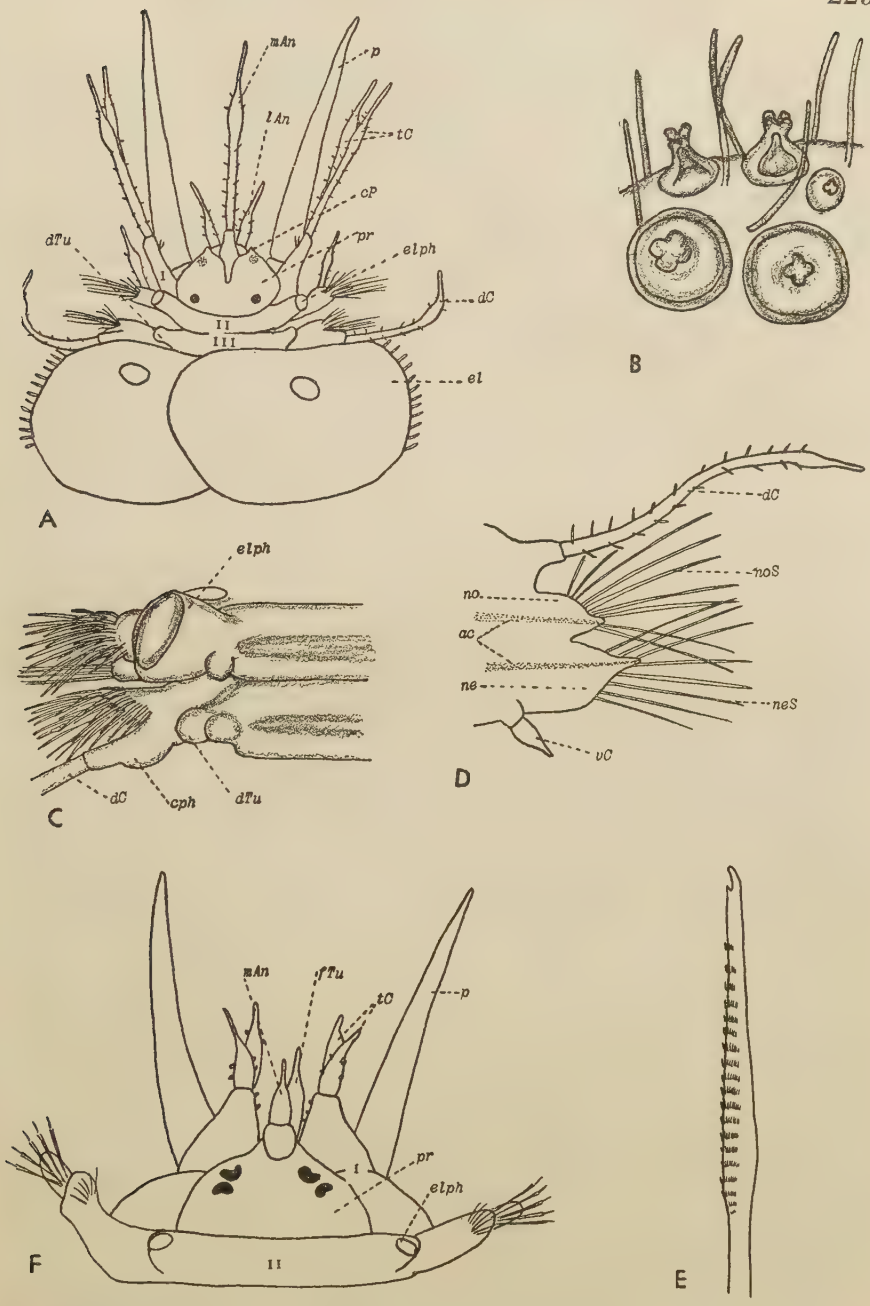


FIGURE 26.—Polynoidae: *a*, *Harmothoë imbricata*, dorsal view anterior end, first pair elytra removed; *b*, *Gattyana cirrosa*, part of elytron enlarged, showing elytral tubercles and papillae; *c*, *Eunoë nodosa*, dorsal view part of two segments showing extra rounded lobes on inner sides of elytrophore and dorsal tubercle; *d*, *Eunoë oerstedi*, biramous parapodium; *e*, *Harmothoë imbricata*, bidentate neuroseta. Sigalionidae: *f*, *Pholoë minuta*, dorsal view anterior end, first pair elytra removed. (For explanation of symbols, see p. 210.)

## Genus *Pholoë* Johnston, 1839

### *Pholoë minuta* (Fabricius, 1780)

FIGURE 26, *f*

*Aphrodita minuta* Fabricius, 1780, p. 314.
*Aphrodita longa* Fabricius, 1780, p. 313.
*Pholoë minuta* Oersted, 1843, p. 169, pl. 1, figs. 3, 4, 8, 9, 16.—Malmgren, 1865, p. 89, pl. 11, fig. 13.—Théel, 1879, p. 24.—Webster and Benedict, 1884, p. 701; 1887, p. 709.—McIntosh, 1900, p. 437, figs.—Moore, 1902, p. 274; 1908, p. 338.—Ehlers, 1913, p. 450.—Southern, 1914, p. 57.—Chamberlin, 1920, p. 5.—Eliason, 1920, p. 22.—Fauvel, 1923, p. 120, fig. 44, a–h.—Augener, 1928, p. 673.—Annenkova, 1934, p. 322; 1937, p. 155; 1938, p. 138.—Berkeley and Berkeley, 1942, p. 189.—Hartman, 1944a, pp. 335, 337; 1948, p. 15.—Thorson, 1946, p. 49, fig. 19; Gorbunov, 1946, p. 38.—Zatsepin, 1948, p. 109, pl. 28, fig. 17.—Hartman and Reish, 1950, p. 8.—Wesenberg-Lund, 1950a, p. 9; 1950b, p. 31; 1951, p. 22.—Pettibone, 1953, p. 77, pl. 39.
*Pholoë tuberculata* Southern, 1914, p. 57, pl. 6, fig. 14, A–L.—Berkeley and Berkeley, 1945, p. 323; 1948, p. 22, fig. 26.

*Description.*—Length 5–25 mm., width including setae 1–4 mm. Segments 36–84. Body small, elongate, nearly linear, flattened dorsoventrally; fragments easily. Lateral ventral surface and ventral sides of parapodial lobes thickly set with small, globular to elongate papillae, usually covered with debris. Prostomium small, oval; anterior and posterior pairs of eyes closely approximated. Single median antenna short, subulate (lateral antennae lacking). Tentacular segment achaetous; tentacular cirri similar to median antenna. A digitiform facial tubercle on a rounded lobe dorsal to the mouth and ventral to the prostomium. (On this character, Southern (1914) differentiated *P. tuberculata;* the lobe, on which the facial tubercle is located, appears to be retractile; surrounded by the bases of the palps, tentacular cirri and median antenna, the facial tubercle is easily overlooked unless the region is quite relaxed.) Elytra numerous, on segments 2, 4, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 24, continuing on all segments to end of body; elytra nearly cover the dorsum except for a narrow middorsal part, usually pressed close to body; elytral surface smooth, with few microtubercles, somewhat areolate as seen under magnification, posterior border with few scattered papillae, somewhat moniliform. Notosetae simple, slender, finely spinous, tapering to capillary tips, upper ones shorter, with pronounced angles, the rest longer, with more gradual curves. Neurosetae stouter than notosetae, compound, with short, falcate terminal pieces. COLOR: In alcohol: Without color or irregularly pigmented greenish gray; elytra translucent, colorless, or greenish gray with a light spot over the place of attachment, or brownish; often with much debris.

*New records.*—Arctic Alaska: Eluitkak Pass, Elson Lagoon near Point Barrow, 6.6 fms.; off Point Barrow base, up to 12.1 miles from shore, 16.7–123.5 fms., on bottoms of stones, masses of worm tubes, and various combinations of mud, gravel, stones, rocks, large perforated rocks, with bryozoans, hydroids; from screen trap through hole in ice, mud (16 stations, 30 specimens). West Greenland: Vaigat, Disko Island, mud, 1937, and Walrus grounds, Murchison Sound, 45 fms., 1938, Bartlett. East Coast North America: Off Labrador, 6 fms., *Blue Dolphin* Expedition, 1949; off Nova Scotia, St. Georges Bank, Maine, Massachusetts, Rhode Island, intertidal to 110 fms., U. S. Fish Commission.

*Distribution.*—Widely distributed in the Arctic: Siberian, Alaskan, and Canadian Arctic, Davis Strait, Greenland, Jan Mayen, Norwegian Sea, Spitsbergen, Franz Josef Land, Novaya Zemlya, Kara Sea. Also Iceland, Faroes, Shetlands, Norway to northern France; Labrador to Rhode Island; Bering Sea to southern Oregon; north Japan Sea; off South Africa. In low water to 1,254 fathoms.

## Family Phyllodocidae

Prostomium subconical, suboval or cordiform, with two eyes, four or five antennae, without palps (fig. 27, *a–d*). Anterior segments 1–3 modified, with two to four pairs tentacular cirri. Parapodia uniramous (exceptionally biramous); setae compound (some may be simple). Dorsal and ventral cirri foliaceous or more or less globular (fig. 27, *e–i*). Two anal cirri. Proboscis eversible, with papillae, unarmed. Active; mucus secreted in quantities.

Represented by four genera and seven species. All genera represented have uniramous parapodia, with compound setae.

### Key to the genera of Phyllodocidae from Point Barrow

1. Tentacular cirri 4 pairs; first tentacular segment rudimentary, not visible dorsally, with 1 pair tentacular cirri lateral to prostomium; second segment distinct, with 2 pairs tentacular cirri; third segment distinct, with 1 pair tentacular cirri, 1 pair normal ventral cirri (fig. 27, *c*, *d*)---------- 2

   Tentacular cirri 3 pairs; first tentacular segment distinct dorsally, with 1 pair tentacular cirri; second segment distinct, with 2 pairs tentacular cirri (fig. 27, *b*). Prostomium oval, without occipital tubercle-----**Mystides** (p. 232)

   Tentacular cirri 2 pairs on first achaetous segment (fig. 27, *a*). Without dorsal cirri on second segment which has a setigerous lobe (may be very small or lacking) and a foliaceous ventral cirrus. Prostomium somewhat triangular, widest basally, with anterior part rounded, with 2 pairs short, subulate, frontal antennae, usually with 2 deep-set eyes (may not be visible when preserved), usually with a median occipital depression containing a small occipital tubercle (not always conspicuous), with a pair of lateral nuchal grooves----------**Eteone** (p. 232)

2. Antennae 4 (2 pairs frontal antennae). Prostomium cordiform, with an occipital tubercle in the posterior notch (fig. 27, *d*). Proboscis with papillae proximally arranged in longitudinal rows ..... **Phyllodoce** (p. 236)
Antennae 5 (2 pairs frontal antennae and unpaired median antenna). Prostomium oval or bluntly conical, without occipital tubercle (fig. 27, *c*). Proboscis with surface smooth, wrinkled, or with few scattered papillae **Eumida** (p. 238)

## Genus *Mystides* Théel, 1879

### *Mystides borealis* Théel, 1879

FIGURE 27, *b*

*Mystides borealis* Théel, 1879, p. 35, pl. 2, figs. 29–32.—Southern, 1914, p. 72, pl. 8, fig. 19, A–D.—Bergström, 1914, p. 176, fig. 64.—Fauvel, 1923, p. 181, fig. 65, a–d.—Augener, 1928, p. 711.—Zatsepin, 1948, p. 113, pl. 29, fig. 15.—Wesenberg-Lund, 1950b, p. 37.
*Mystides viridis* Webster and Benedict, 1887, p. 712, pl. 1, figs. 10, 11, 13; pl. 2, fig. 12. (Type in USNM.)
*Mystides notialis* Ehlers, 1913, p. 457, pl. 29, figs. 1–4.

*Description.*—Length 5–9 mm., width 0.5 mm. Segments 33–64 (up to 16 mm. long and 73 segments—Ehlers, 1913). Body small, linear, tapering anteriorly and posteriorly, flattened dorsoventrally. Prostomium oval, wider than long, with two deeply-set eyes in middle of prostomium, with four long, filiform antennae about one-third way back from anterior tip. Tentacular cirri 3 pairs, enlarged basally, with long, filiform tips. Dorsal, ventral, and anal cirri oval, thick, flattened. COLOR: In alcohol: Without color or irregularly pigmented with brown; cirri deep reddish brown.

*Remarks.*—The description of *M. notialis* from the Antarctic by Ehlers (1913) follows closely that of *M. borealis* and is herein considered to be synonymous.

*New records.*—ARCTIC ALASKA: Off Point Barrow, 7.5 miles from shore, 36 fms., on bottom of stones, perforated rocks (1 station, 2 specimens). WEST COAST NORTH AMERICA: Off Flat Point, Lopez Island, Washington Sound, Pettibone (1 specimen).

*Distribution.*—Scattered records in the Arctic: Arctic Alaska, West Greenland, Spitsbergen, Novaya Zemlya. Also Ireland, Madeira, Mediterranean; east coast North America (Maine); west coast North America (Washington Sound); Antarctic (Kerguelen). In 4–214 fathoms.

## Genus *Eteone* Savigny, 1817

The four species represented have the body elongate, somewhat flattened dorsoventrally, tapering anteriorly and posteriorly, with segments numerous (100–300). Proboscis with a circle of soft papillae around opening.

## Key to the species of Eteone from Point Barrow

1. Proboscis with 2 lateral, longitudinal rows of numerous soft papillae. Dorsal pair tentacular cirri slightly longer or up to 2–3 times longer than ventral pair. Dorsal cirri wider than long, nearly symmetrical, subcircular or slightly lanceolate (fig. 27, *e*). Color in alcohol: Darkly pigmented with bluish-violet iridescence, with longitudinal, lighter colored bands on each side of median dorsal line (or 3 dorsal longitudinal dark bands—1 median and 2 lateral). Anal cirri subcylindrical, 3–4 times longer than wide. Second segment with setigerous lobe and setae well developed---**E. barbata**

   Surface of proboscis smooth, rugose or irregularly papillate. Two pairs tentacular cirri subequal or ventral pair somewhat longer than dorsal pair--- 2

2. Dorsal cirri small, not much larger than parapodial lobes, longer than or as long as wide, almost symmetrical, thick, flattened, bluntly conical (fig. 27, *h*). Anal cirri short, thick, almost spherical. Second segment with setigerous lobe and setae well developed----------**E. longa**

   Dorsal cirri much larger than parapodial lobes, wider than long---------- 3

3. Dorsal cirri slightly asymmetrical, oval (fig. 27, *g*). Color in alcohol: Dorsum brownish with bluish-violet irridescence. Anal cirri short, thick, almost spherical. Second segment with setigerous lobe and setae well developed.

   **E. flava**

   Dorsal cirri much wider than long (about 2.5 times), asymmetrical, obliquely oval, with lower part larger than upper part (fig. 27, *f*). Color in alcohol: Middle third of dorsum light brownish, lateral third deep reddish brown. Anal cirri elongate, cylindrical, 3–4 times longer than wide. Second segment with setigerous lobe and setae poorly developed or lacking.

   **E. spetsbergensis**

## Subgenus *Mysta* Malmgren, 1865

### *Eteone* (*Mysta*) *barbata* (Malmgren, 1865)

FIGURE 27, *e*

*Mysta barbata* Malmgren, 1865, p. 101, pl. 15, fig. 34; 1867, p. 26, pl. 3, fig. 20.—Bergström, 1914, p. 207, fig. 79.—Southern, 1914, p. 75.—Eliason, 1920, p. 28.—Augener, 1928, p. 711; 1939, p. 136.—Zatsepin, 1948, p. 113, pl. 29, fig. 14.—Wesenberg-Lund, 1951, p. 31.

*Eteone striata* Ditlevsen, 1917, p. 66, pl. 5, figs. 11, 17, 19.

*Eteone* (*Mysta*) *barbata* Fauvel, 1923, p. 176.—Annenkova, 1937, p. 159; 1938, p. 146.—Berkeley and Berkeley, 1942, p. 190.—Thorson, 1946, p. 62, fig. 27, A–B.

*Description.*—Length 42–180 mm.; width without setae 2.5–7 mm. See key. COLOR: In life: Three iridescent, brownish-purple dorsal longitudinal bands, median and lateral.

*New records.*—ARCTIC ALASKA: Eluitkak Pass, Elson Lagoon near Point Barrow, stony-mud; off Point Barrow base, 6.1–27 fms., up to 3.2 miles from shore, on bottoms of mud, gravel, stones, rocks; also caught in trap on bottom (3 stations, 4 specimens).

*Distribution.*—Scattered records in the Arctic: Siberian and Alaskan Arctic, Spitsbergen, Novaya Zemlya, Kara Sea. Also Iceland, Norway to Ireland, North Sea, Baltic; Bering Sea; north Japan Sea. In 5.5–60 fathoms.

### *Eteone longa* (Fabricius, 1780)

FIGURE 27, *h*

*Nereis longa* Fabricius, 1780, p. 300.

*Eteone longa* Oersted, 1843, p. 185, pl. 2, figs. 20, 28.—Bergström, 1914, p. 192, fig. 72.—Chamberlin, 1920, p. 11.—Eliason, 1920, p. 26.—Fauvel, 1923, p. 172, fig. 62, a–d; 1933, p. 16.—Augener, 1928, p. 710; 1939, p. 136.—Annenkova, 1934, p. 322; 1937, p. 158; 1938, p. 145.—Thorson, 1946, p. 59, fig. 26, A–E.—Gorbunov, 1946, p. 38.—Zatsepin, 1948, p. 113, pl. 29, fig. 13.—Berkeley and Berkeley, 1948, p. 41, figs. 57, 58.—Wesenberg-Lund, 1950a, p. 11, pl. 2, figs. 6, 7; 1950b, p. 38; 1951, p. 29.

*Eteone arctica* Malmgren, 1867, p. 27, pl. 2, fig. 12.

*Eteone cinerea* Webster and Benedict, 1884, p. 705, pl. 1, figs. 1–5.

*Eteone tuberculata* Treadwell, 1922, p. 174, figs. 7–10.

*Eteone californica* Hartman, 1936a, p. 131, figs. 43–46; 1948, p. 20, fig. 4, a–d.—Rioja, 1941, p. 687.

*Description.*—Length 10–65 mm., width without setae 0.5–3 mm. (length up to 160 mm.—Berkeley and Berkeley, 1948). See key. COLOR: In life: White.

*Remarks.*—*E. tuberculata* Treadwell (1922) from Friday Harbor, Washington, *E. californica* Hartman (1936) from central California (type examined as well as specimens from southeastern Alaska—Hartman, 1948), and *E. cinerea* Webster and Benedict (1884) from Provincetown, Massachusetts (type in USNM), appear to be synonymous with *E. longa*.

*New records.*—ARCTIC ALASKA: Eluitkak Pass, Elson Lagoon near Point Barrow, 6.6 fms.; off Point Barrow base, 1.7–75.5 fms., up to 8 miles from shore, on bottoms of sandy-mud, stones, and various combinations of mud, pebbles, stones, gravel, rocks (12 stations, 40 specimens). WEST COAST NORTH AMERICA: San Juan Archipelago, Washington, Pettibone. WEST GREENLAND: Vaigat, Disko Island, mud, Bartlett, 1937.

*Distribution.*—Widely distributed in the Arctic: Siberian, Alaskan, and Canadian Arctic, Greenland, Spitsbergen, Franz Josef Land, Novaya Zemlya. Also Iceland, Norway to English Channel; Hudson Bay to Massachusetts; Bering Sea to México; north Japan Sea; China. In low water to 518 fathoms.

***Eteone flava* (Fabricius, 1780)**

FIGURE 27, *g*

*Nereis flava* Fabricius, 1780, p. 299.

*Eteone flava* Malmgren, 1865, p. 102, pl. 15, fig. 35.—Bergström, 1914, p. 196, fig. 74.—Eliason, 1920, p. 27.—Fauvel, 1923, p. 173, fig. 62, e, f.—Augener, 1928, p. 709.—Annenkova, 1937, p. 158; 1938, p. 145.—Zatsepin, 1948, p. 113, pl. 29, fig. 12.—Wesenberg-Lund, 1950a, p. 11, pl. 2, fig. 7, c; 1950b, p. 39; 1951, p. 30.

*Eteone depressa* Malmgren, 1865, p. 103, pl. 15, fig. 36.—Southern, 1914, p. 79.

*Eteone sarsi* Malmgren, 1867, p. 28, pl. 2, fig. 14.—Webster and Benedict, 1887, p. 711.

*Eteone lentigera* Malmgren, 1867, p. 29, pl. 2, fig. 13.

*Description.*—Length 24–68 mm.; width without setae 1–4 mm. (length up to 120 mm.—Fauvel, 1923). See key. COLOR: In life: Pinkish flesh and grayish white.

*New records.*—ARCTIC ALASKA: Eluitkak Pass, Elson Lagoon near Point Barrow, 6.6 fms.; off Point Barrow base, 8.3–54.6 fms., up to 7.5 miles from shore, on bottoms of mud, and various combinations of mud, stones, gravel, rock, large perforated rocks, shells (10 stations, 22 specimens).

*Distribution.*—Widely distributed in the Arctic: Siberian and Alaskan Arctic, Greenland, Spitsbergen, Novaya Zemlya. Also Iceland, Faroes, Norway to English Channel; east coast North America (Maine); Bering Sea; north Japan Sea. In low water to 471 fathoms.

***Eteone spetsbergensis* Malmgren, 1865**

FIGURE 27, *f*

*Eteone spetsbergensis* Malmgren, 1865, p. 102, pl. 15, fig. 38.—Théel, 1879, p. 31, pl. 2, figs. 21, 22.—Bergström, 1914, p. 202, fig. 77.—Ditlevsen, 1917, p. 66, pl. 5, figs. 12, 14, 18.—Eliason, 1920, p. 27.—Augener, 1928, p. 708.—Annenkova, 1937, p. 159; 1938, p. 145.—Hartman, 1948, p. 20, fig. 5, b.—Berkeley and Berkeley, 1948, p. 42.—Zatsepin, 1948, p. 113, pl. 29, fig. 11.—Wesenberg-Lund, 1951, p. 31.

*Description.*—Length 17–75 mm., width without setae 0.7–4 mm. (length up to 100 mm.—Augener, 1928). See key. COLOR: In life: Pale green ventrally, reddish brown dorsolateral bands, with dark dorsal cirri; orange colored eggs.

*New records.*—ARCTIC ALASKA: Off Browerville near Point Barrow; off Point Barrow base, 1.7–36 fms., up to 4⅓ miles from shore, on bottoms of sandy-mud and various combinations of mud, gravel, rocks, stones, shell (4 stations, 4 specimens).

*Distribution.*—Scattered records in the Arctic: Arctic Alaska, Spitsbergen, Franz Josef Land, Novaya Zemlya. Also Iceland, Norway to Scotland; Bering Sea; western Canada; north Japan Sea. In 1.7–40 fathoms.

261112—54——3

### *Eteone* sp. larvae

Larvae of a species of *Eteone* found in a mass of jelly (off Point Barrow base, 1.7 fms., 300 ft. out, on sandy-mud, July 20, 1948); 11 segments, of which 8 were setigerous; triangular prostomium with short antennae and eyes; tentacular segment with short tentacular cirri; anal cirri short, spherical.

## Genus *Phyllodoce* Savigny, 1817

### Subgenus *Anaitides* Czerniavsky, 1882

### *Phyllodoce* (*Anaitides*) *groenlandica* Oersted, 1842

FIGURE 27, *d*, *i*

*Phyllodoce groenlandica* Oersted, 1842, p. 121 (*fide* Bergström, 1914); 1843, p. 192, pl. 2, figs. 19, 21, 22, 29–32.—Malmgren, 1865, p. 96; 1867, p. 21, pl. 2, fig. 9.—Webster and Benedict, 1884, p. 703; 1887, p. 710.—Murdoch, 1885, p. 153.—Moore, 1903, p. 428.—McIntosh, 1908, p. 86, figs.—Ditlevsen, 1917, p. 56.—Fauvel, 1923, p. 153, fig. 54, f–i.—Augener, 1928, p. 703.—not Treadwell, 1937, p. 28 (=*Paranaitis wahlbergi* (Malmgren), in USNM).—Annenkova, 1937, p. 156.—Friedrich, 1939, p. 122.—Thorson, 1946, p. 52, fig. 21.—Gorbunov, 1946, p. 38.—Berkeley and Berkeley, 1948, p. 46, fig. 66.—Wesenberg-Lund, 1950a, p. 10; 1950b, p. 32; 1951, p. 26.

*Phyllodoce citrina* Moore, 1908, p. 328.—Hartman, 1948, p. 19 (part; includes *P. groenlandica* and *P. mucosa*, in USNM; not *P. citrina* Malmgren, 1865).

*Anaitides groenlandica* Bergström, 1914, p. 141, fig. 42.—Southern, 1914, p. 68.—Eliason, 1920, p. 24 (part).—Chamberlin, 1920, p. 11.—Hartman, 1944a, pp. 335, 338; 1948, p. 19.—Zatsepin, 1948, p. 111, pl. 29, fig. 2.

*Description.*—Length 16–285 mm., width without setae 1–9 mm. (length up to 450 mm.—Ditlevsen, 1917). Segments very numerous. Body elongate, large, robust, linear, flattened, attenuate posteriorly. Prostomium cordiform, notched posteriorly with an occipital tubercle in the notch, with four short subulate frontal antennae, with small, paired, lateral, retractile, nuchal knobs just anterior to the first pair of tentacular cirri. Tentacular cirri unequal; two pairs short, two pairs longer, extending to segments 9–11. Dorsal cirri of median region up to two times longer than wide, subquadrangular, with distal ends truncate; ventral cirri oval, with asymmetrical acuminate tip. Anterior part of extended proboscis transversely rugose, crowned with 17 papillae; basal part with 12 longitudinal rows of small, oval papillae (6 rows on each side), with 10–20 papillae per row. COLOR: In life and in alcohol: Body with bluish iridescence, usually heavily pigmented dark greenish brown or deep reddish blue, with dorsal and ventral cirri tan to dark brown; on some, body not so darkly pigmented, with cirri only partly pigmented.

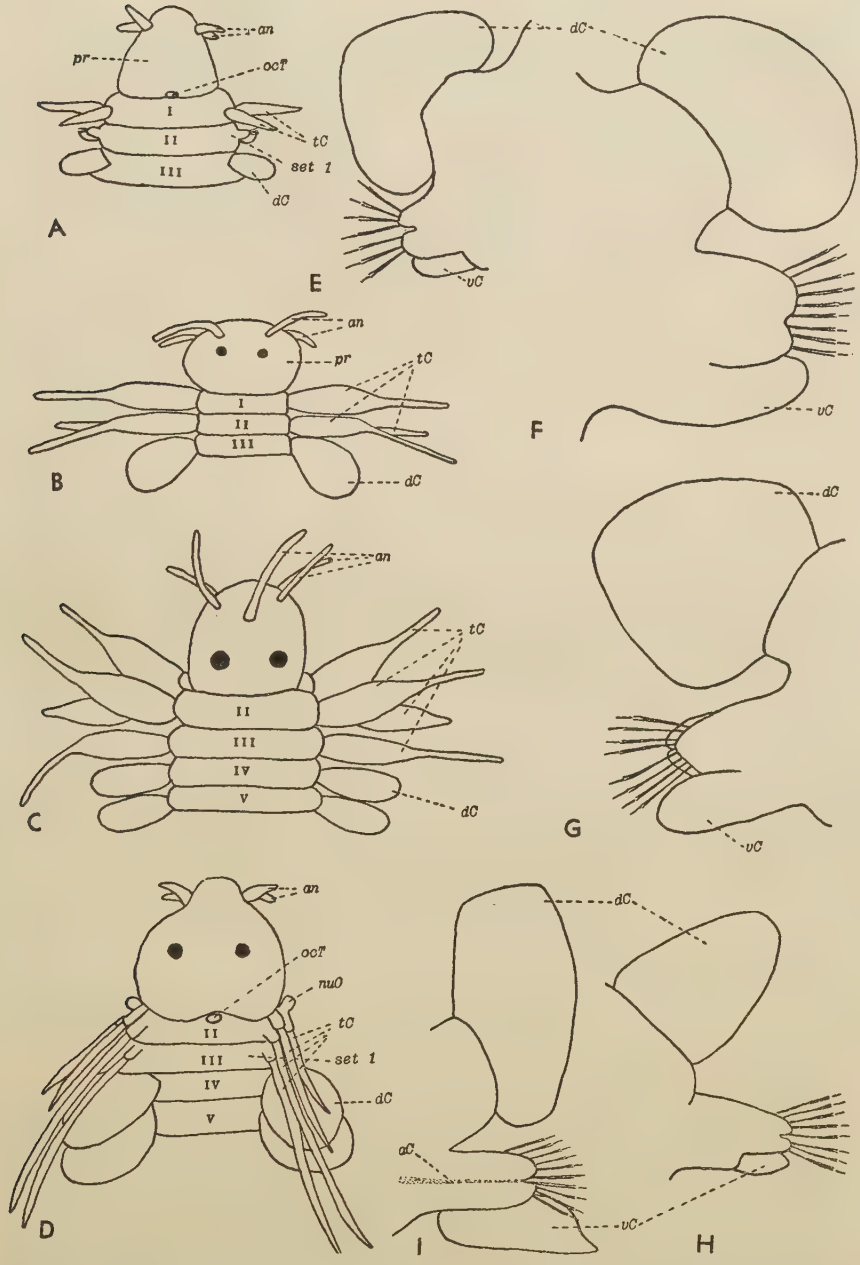


FIGURE 27.—Phyllodocidae: *a*, *Eteone*, dorsal view anterior end; *b*, *Mystides borealis*, dorsal view anterior end; *c*, *Eumida minuta*, dorsal view anterior end; *d*, *Phyllodoce groenlandica*, dorsal view anterior end; *e*, *Eteone barbata*, parapodium; *f*, *Eteone spetsbergensis*, parapodium; *g*, *Eteone flava*, parapodium; *h*, *Eteone longa*, parapodium; *i*, *Phyllodoce groenlandica*, parapodium. (For explanation of symbols, see p. 210.)

*Remarks.*—Some smaller specimens were at first placed under *P. citrina* Malmgren, since the papillae on the proboscis were fewer than normal, four rows on each side, with 3–5 papillae per row. An intermediate-sized specimen from Canoe Bay, Alaska (Hartman, 1948, as *P. citrina*) has five rows on each side, with as many as 6 papillae per row. It appears that the papillae are added on gradually and that only in the fully developed individual is the full complement of 6 rows of papillae on each side developed; the number per row is variable, ranging from 10 (with some spaces as if some had dropped off) to 20.

*New records.*—Arctic Alaska: Eluitkak Pass, Elson Lagoon near Point Barrow; Point Barrow base, washed ashore; off Point Barrow base, up to 12.1 miles from shore, 1.7–123.5 fms., on bottoms of mud, sandy-mud, mass of worm tubes, and various combinations of mud, gravel, stones, pebbles, rocks, large perforated rocks, shells; in screen trap on bottom (23 stations, 74 specimens). West Greenland: Vaigat, Disko Island, mud, Bartlett, 1937. East Coast North America: Off Labrador, 70 fms., *Blue Dolphin* Expedition, 1950; off Maine, Massachusetts, intertidal to 42 fms., U. S. Fish Commission. West Coast North America: Washington Sound, Pettibone.

*Distribution.*—Widely distributed in the Arctic: Siberian, Alaskan, and Canadian Arctic, Davis Strait, Greenland, Spitsbergen, Franz Josef Land, Barents Sea, Novaya Zemlya, Kara Sea; Also Iceland, Faroes, Norway to English Channel; Hudson Bay to Massachusetts; Bering Sea to Washington; north Japan Sea. In low water to 800 fathoms.

## Genus *Eumida* Malmgren, 1865

### *Eumida minuta* (Ditlevsen, 1917)

Figure 27, *c*

*Eulalia minuta* Ditlevsen, 1917, p. 56, pl. 4, figs. 10, 12, 14.—? Gorbunov, 1946, p. 38.

*Eulalia arctica* Annenkova, 1946, pp. 185, 187, fig. 1, a–c.

*Description.*—Length 1–8 mm.; width without setae 0.3–0.8 mm. Segments few (12–36). Body very small, slightly tapered anteriorly and posteriorly, flattened dorsoventrally. Prostomium semiglobular to bluntly conical, with two large eyes near posterior border, with antennae rather long, slender, filamentous, almost as long as prostomium. First tentacular achaetous segment not distinct dorsally, with first pair tentacular cirri lateral to prostomium at same level as the eyes (thus placed under *Eumida* and not *Eulalia* Savigny); two pairs tentacular cirri on second segment (first setigerous); fourth tentacular cirri on third segment; tentacular cirri enlarged basally,

with slender filamentous tips, the latter about as long as the enlarged basal part except for the ventral tentacular cirri on the second segment which are much shorter. Dorsal cirri oval or bluntly conical. Ventral cirri elongate oval. Anal cirri short, oval, 1.5 to 2 times longer than wide. Color: In alcohol: Greenish tan to brown. In life: Flesh ventrally, green and flesh dorsally, with salmon-colored eggs showing through.

*New records.*—Arctic Alaska: Off Point Barrow base, 16.7–75.5 fms., up to 8 miles from shore, on various combinations of gravel, small stones, rocks, bryozoans, hydroids, *Saxicava* shells (6 stations, 46 specimens).

*Distribution.*—Few scattered records in the Arctic: Siberian and Alaskan Arctic, Davis Strait. In 16.7–75.5 fathoms.

## Family Hesionidae

Prostomium usually with four eyes, two or three antennae, two biarticulate palps (fig. 28, *a*). Two to eight pairs tentacular cirri on one to four more or less distinct achaetous tentacular segments. Parapodia biramous or subbiramous; notopodia may be greatly reduced, with notosetae simple or lacking; neurosetae compound (fig. 28, *b*). Dorsal cirri long, more or less distinctly articulated; ventral cirri shorter; two long anal cirri. Proboscis cylindrical, eversible, with marginal papillae, with or without horny jaws.

Represented by a single species from Point Barrow. (The specimens from Point Barrow, referred to *Castalia multipapillata* Théel by Murdoch (1885), do not agree with this species nor with any other species of hesionid; the parapodia are biramous, both lobes being pointed, the notopodia are well developed, with capillary setae; neurosetae compound, with delicate tips; the proboscis has numerous small papillae; tentacular cirri four pairs; prostomium with two pairs eyes, pair biarticulate palps, antennae ? (missing or absent); the specimens are very small and in poor condition.)

### Genus *Castalia* Savigny, 1820; emend. Fauvel, 1923

#### *Castalia aphroditoides* (Fabricius, 1780)

Figure 28, *a*, *b*

*Nereis aphroditoides* Fabricius, 1780, p. 296.
*Castalia arctica* Malmgren, 1867, p. 32.—Annenkova, 1931, p. 203.
*Castalia fabricii* Malmgren, 1867, p. 32.—Théel, 1879, p. 37, pl. 3, figs. 36, 37.—Berkeley and Berkeley, 1943, p. 130.
*Castalia aphroditoides* Wirén, 1883, p. 401.—Augener, 1913, p. 260; 1928, p. 715.—Zatsepin, 1948, p. 114.—Wesenberg-Lund, 1950a, p. 13, pl. 3, fig. 14; 1950b, p. 44.
*Psammate aphroditoides* Chamberlin, 1920, p. 13.

*Description.*—Length 2.5–18 mm., width without setae 0.7–2.5 mm. Segments 25–43. Body cylindrical. Prostomium rectangular, wider than long, widest anteriorly, notched posteriorly, with two pairs eyes in trapezoidal arrangement, anterior pair larger; palps on anterolateral borders of prostomium; two filiform antennae medial to palps (without unpaired antenna); antennae subequal, about same length as prostomium. Six pairs tentacular cirri on three more or less distinct achaetous segments; tentacular cirri long, filiform, articulated, with prominent cirrophores. Without distinct notopodia (acicula in cirrophores of dorsal cirri only); without notosetae. Neuropodia well developed, with three diverging conical distal lobes: Lip anterior to setae with median and dorsal conical lobes; lip posterior to setae with rounded median and conical ventral lobes; neurosetae compound. Dorsal and anal cirri long, articulated. Proboscis barrel-shaped with 10 soft papillae around opening (four dorsal to lateral grooves, three each on two ventrolateral folds), with a median ventral notch, with two thickened ventrolateral ridges (the so-called jaws) lateral to the ventral notch. Color: In alcohol: Without color, or slightly greenish dorsally (especially in anterior part), or brownish. In life: Orange-flesh, with greenish eggs inside, with red eyes.

*Remarks.*—Two young specimens found in plankton tow beneath ice February 28, 1950.

*New records.*—Arctic Alaska: Eluitkak Pass, Elson Lagoon near Point Barrow, 6.6 fms., stony-mud; off Point Barrow base, 21–75.5 fms., up to 8 miles from shore, on bottoms of mud, stones, and various combinations of mud, stones, gravel, rocks, and from breaking apart foliaceous bryozoans (10 stations, 28 specimens). Northwest Greenland: Walrus grounds, Murchison Sound, Bartlett, 1938. East Coast North America: Off Labrador, 45 fms., *Blue Dolphin* Expedition, 1949.

*Distribution.*—Widely distributed in the Arctic: Siberian, Alaskan, and Canadian Arctic, Greenland, Spitsbergen, Franz Josef Land, Novaya Zemlya, Kara Sea. Also Bering Sea; Denmark; Hudson Bay, Labrador. In 2–75.5 fathoms.

## Family Syllidae

Body of small size. Prostomium with four eyes (sometimes six), two palps (may be reduced and fused), three antennae (figs. 28, 29). Tentacular segment achaetous, with one or two pairs tentacular cirri. Parapodia uniramous, with dorsal and ventral cirri (latter may be absent). Two anal cirri. Setae mostly compound, sometimes with additional simple setae. Proboscis eversible, armed or not with one

to several chitinous teeth. Reproduction direct (epigamy) or by stolons, sometimes having sexual dimorphism; with swimming capillary setae at maturity.

Represented by 6 genera and 11 species.

### Key to the genera of Syllidae from Point Barrow

1. Without ventral cirri. Palps reduced, united, turned under on ventral side of prostomium (except for forked palps of male stolon; fig. 29, *a*). Antennae and dorsal cirri smooth or faintly annulated. Reproduction by stolons; stem forms produce by transverse fission, singly or in chains, sexually dimorphic male and female forms with swimming setae ..... **Autolytus**—2

   With ventral cirri (fig. 28, *d*). Palps better developed, free or fused ..... 4

2. Prostomium normal, with 4 dorsal eyes in trapezoidal arrangement, with 3 antennae, short fused palps; 2 pairs tentacular cirri (fig. 29, *a*). Without swimming setae. Pharynx long, more or less sinuous, usually with a crown of teeth ..... Stem form or stock of **Autolytus** (p. 242)

   Prostomium abnormal, with 4 large eyes (usually 2 dorsolateral and 2 ventrolateral); 2–3 pairs tentacular cirri (fig. 29, *c–f*). Body divided into an anterior unmodified region, a middle region with long swimming setae and well-developed, paddlelike parapodia, and with or without a posterior unmodified region. Without pharynx ..... Sexual stolons of **Autolytus**—3

3. Prostomium with 3 antennae (very long median one and pair of small frontal ones) and pair of anterior bifurcate palps; 1 pair tentacular cirri very long, similar to median antennae (these may be the dorsal cirri of the first setiger or of a small, knoblike achaetous lobe; fig. 29, *e, f*). Testes and sperm confined to anterior unmodified region.

   Male form of **Autolytus** (*Polybostrichus*) (p. 242)

   Prostomium with 3 subequal antennae, without palps; none of tentacular cirri especially elongate (fig. 29, *c, d*). Most of body filled with eggs; eggs carried in large sac on ventral surface (gestation).

   Female form of **Autolytus** (*Sacconereis*) (p. 242)

4. Dorsal cirri distinctly moniliform throughout body (fig. 28, *c*). Palps separate for their entire length or fused basally. Reproduction direct or by single stolons. Sexual stolons (*Chaetosyllis*): Small prostomium, with 2 pairs eyes, pair short moniliform antennae; without tentacular cirri; 1 anterior unmodified segment, a middle region with long swimming setae, and few unmodified posterior segments ..... **Syllis** (p. 252)

   Dorsal cirri smooth or indistinctly articulate (may be more or less articulate anteriorly). Palps fused at base only or throughout ..... 5

5. Palps fused for nearly their entire length (fig. 28, *k–m*). Body very small. Antennae and dorsal cirri short, not moniliform. One pair tentacular cirri (may be rudimentary). Reproduction generally direct, with swimming setae at maturity; eggs and larvae fixed to dorsal or ventral surface of female ..... 6

   Palps fused at base only (fig. 28, *g*). Body larger. Antennae and dorsal cirri longer, smooth (antennae and anterior dorsal cirri may be indistinctly articulate, especially distally). Two pairs tentacular cirri. Reproduction direct, with swimming setae at maturity ..... 7

6. Antennae and dorsal cirri swollen at base, tapering to narrow tip (fig. 28, *m*). Body and parapodia usually covered with adhesive papillae and fine, granular material ..... **Sphaerosyllis** (p. 255)
   Antennae and dorsal cirri clavate or conical (fig. 28, *k*, *l*). Body and parapodia not covered with papillae ..... **Exogone** (p. 257)
7. Compound neurosetae with distal blades all rather short (fig. 28, *i*). Proboscis with a distal and proximal row of soft papillae, with distal circular chitinous margin denticled (fig. 28, *g*, *h*) ..... **Eusyllis** (p. 259)
   Compound neurosetae with some distal blades elongate (fig. 28, *j*). Proboscis with distal row of soft papillae only, with distal circular chitinous margin smooth ..... **Pionosyllis** (p. 262)

## Genus *Autolytus* Grube, 1850

In working over the rather numerous specimens of *Autolytus* in the collections from Point Barrow, several things were revealed which throw light on the confusion in this group caused by the formation of sexually dimorphic stolons. For correct description of any species, one should have the stem form, the sexual buds in the process of formation including the mature sexual buds attached to the stem form, and the mature male and female stolons separated from the stem. Very often, however, stem forms and the male and female stolons of one species have been described and given different names, while sexual stolons and stem forms of different species have been given the same name. *A. fallax* Malmgren, described originally from specimens from Spitsbergen, is of particular interest. Malmgren described and figured the stem form with the head of a male stolon forming between setigers 13 and 14 and indicated that the sexual stolons were not known. *A. prismaticus* (Fabricius), described originally from specimens from Greenland, has a characteristic color pattern of three dark longitudinal bands (median and lateral at the level of the bases of the dorsal cirri). The sexual stolons have six unmodified setigers anterior to the setigers with swimming setae; the stolons show the characteristic color pattern of the stem form. In the absence of color, it would be difficult to distinguish *A. prismaticus* from certain other species of *Autolytus*. It apparently has been the usual practice to identify any sexual stolon of unknown connections that has six anterior unmodified setigers as *A. prismaticus*, and sometimes to identify the male stolons as *Polybostrichus longosetosus* Oersted or *A. longisetosus* (Oersted). However, as found in the Point Barrow material, *A. fallax* is the most common species of *Autolytus* and it was found along with *A. prismaticus* and *A. alexandri*. The majority of the specimens of *A. fallax* were in the process of stolon formation, the head of the stolon being formed between setigers 13

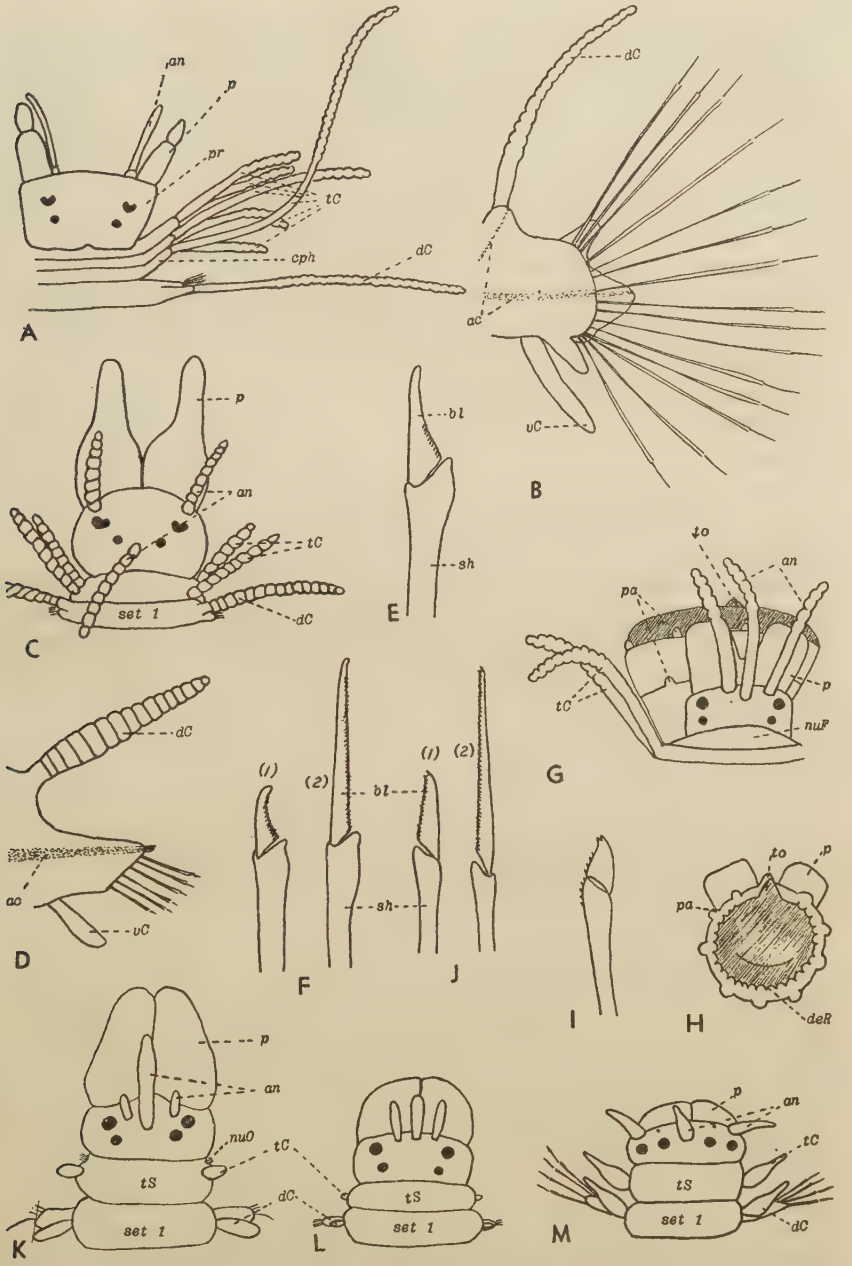


FIGURE 28.—Hesionidae: *a*, *Castalia aphroditoides*, dorsal view anterior end; *b*, same, parapodium, posterior view. Syllidae: *c*, *Syllis fasciata*, dorsal view anterior end; *d*, same, parapodium; *e*, same, neuroseta; *f*, *Syllis cornuta*, neurosetae, with short (1) and long (2) blades; *g*, *Eusyllis blomstrandi*, dorsal view anterior end, proboscis partially extended; *h*, same, frontal view extended proboscis showing distal row of papillae and denticled margin; *i*, same, neuroseta; *j*, *Pionosyllis compacta*, neurosetae, lower one (1) with shorter blade, upper one (2) with longer blade; *k*, *Exogone dispar*, dorsal view anterior end; *l*, *Exogone naidina*, dorsal view anterior end; *m*, *Sphaerosyllis erinaceus*, dorsal view anterior end. (For explanation of symbols, see p. 210.)

and 14. Although no mature sexual buds were found attached to the stem form, the rudiments of the notopodia with the developing swimming setae could be seen, beginning on setiger 7. Male and female stolons with six anterior unmodified segments were found. Of these, two female stolons showed the characteristic banding of *A. prismaticus* (this banding was noted on all the developing sexual buds still attached to the stem forms of this species). The others did not show this banding and are considered to be the sexual stolons of *A. fallax*. *A. fallax*, then, along with *A. prismaticus*, has six anterior, unmodified setigers and many of the records of *A. prismaticus* in the literature will no doubt prove to be *A. fallax*.

The stem form of *A. fallax* has been referred to *A. prolifer* (Müller) by Augener (1913, 1928) and Wesenberg-Lund (1947), thus the stem form of *A. fallax* has been confused with *A. prolifer* and sexual forms with *A. prismaticus*.

There appears to be a correlation in the place of formation of the sexual stolons in the stem form with the number of anterior, unmodified setigers and the number of tentacular cirri in the sexual stolons. At least for a group of species, including *A. prismaticus*, *A. fallax*, *A. cornutus* A. Agassiz, and *A. ornatus* (Verrill, 1873), the stem forms produce sexual stolons singly, with the head of the stolon forming between setigers 13 and 14. The stolon, then, consists of the segments of the stem posterior to setiger 13 (differing from *A. prolifer* where the sexual stolons are proliferated more posteriorly, often in chains of 2 to 8). The posterior part develops gradually into the male or female sexual stolon and breaks off when mature. The anterior 13 setigers of the stem regenerates another posterior end. The sexual stolons of these four species have six unmodified setigers anterior to the swimming setae and usually a more or less developed unmodified posterior region. The stolons have three pairs of tentacular cirri on the first two achaetous tentacular segments; the first two pairs on the first segment and the third pair on the second segment. The upper pair of tentacular cirri on the first segment are similar to the dorsal cirri. The lower pair may be very short, about the length of the prostomium. The third pair of tentacular cirri in the female are similar to the dorsal cirri; in the male they are very long, similar to the median antenna. In addition, there are a pair of small achaetous lobes. In contrast, in *A. prolifer* the sexual stolons have three anterior unmodified setigers (sometimes two or four) and a poorly developed posterior region; there is a single tentacular achaetous segment with two pairs of tentacular cirri (in the female both the upper and lower pairs are short; in the male the lower one is similar to the dorsal cirri and the upper one is very long, similar to the median antenna). In *A. alexandri* the sexual stolons have 14 (sometimes 13) anterior

unmodified setigers and a well-developed posterior region; there is a single achaetous tentacular segment with two pairs of tentacular cirri; the first setigerous segment in the female is similar to the following segment, but in the male it has a very long pair of dorsal cirri similar to the median antenna. Thus the male stolons of the different species of *Autolytus* agree in having a very long pair of anterior cirri similar to the median antenna, but they may be developed as the upper pair of tentacular cirri of a single tentacular segment as in *A. prolifer*, as the dorsal cirri of the first setigerous segment as in *A. alexandri*, or as the third pair of tentacular cirri on the second tentacular segment just dorsal to a pair of achaetous lobes as in *A. prismaticus*.

The number of setigers in the anterior, unmodified region of the sexual stolons appears to be a good taxonomic character for most species. That the number is somewhat variable in *A. prolifer* (usually three, sometimes two and four) does not mean that it is of no significance in other forms. Thus the specimens of *Autolytus* with six anterior unmodified setigers, which Dales (1951) referred to *A. prolifer*, are no doubt another species. The description agrees well with that of *A. cornutus*.

All three species of *Autolytus* from Point Barrow have the body linear elongate, attenuated posteriorly, flattened ventrally, arched dorsally. Prostomium with four eyes in trapezoidal arrangement, with palps fused, turned ventrally, exceeding the prostomium only slightly. Neuropodia with composite setae with blades short, bidentate, and usually with a simple bayonette seta.

### Key to the species of Autolytus from Point Barrow

1. Stem Form: Dorsal cirri irregular in length, at least some longer than body width, pigmented with reddish globules; body whitish, brownish, or transversely banded with reddish globules, 2 narrow bands per segment; with nuchal epaulettes on first 2 (to 4) setigers; sexual buds formed singly (?), the heads forming posterior to setiger 14. Sexual Stolons: 14 setigers anterior to swimming setae; nuchal epaulettes on first 3 setigers; 2 pairs tentacular cirri, the upper one longer; in male, first pair dorsal cirri on first setiger very long, similar to median antenna; female stolons with 2-lobed egg sac ..... **A. alexandri**

   Stem Form: Dorsal cirri, except anterior 2 pairs, shorter than body width, not extending beyond or only slightly beyond the setae, subequal; sexual buds formed singly, the heads forming between setigers 13 and 14. Sexual Stolons: 6 setigers anterior to swimming setae; 3 pairs tentacular cirri; in male, first pair similar to dorsal cirri, with second short pair at its ventral base, third pair very long and stout (similar to median antenna) with small achaetous lobe at its ventral base (fig. 29, *e, f*); in the female, similar except both the first and third pairs are similar to the following dorsal cirri (fig. 29, *c, d*); female stolons with 1-lobed egg sac ..... 2

2. Stem Form: Usually with 2 dorsolateral longitudinal black to brown bands just dorsal to bases of dorsal cirri (may be faint or absent); with short semicircular epaulettes on tentacular segment only. Sexual Stolons: Colorless or female stolon dusky, especially posteriorly; male stolon rusty brown, darkest on anterior region, especially laterally; epaulettes on tentacular segment only (fig. 29, *c–f*)----------**A. fallax**

Stem Form: With 3 longitudinal black bands, 1 medium and 2 lateral at same level as bases of dorsal cirri; medium band continuous throughout length of body, lateral ones may fade out in anterior fourth or be lacking; with semicircular epaulettes on tentacular segment and part of first setiger (fig. 29, *a*). Sexual Stolons: With 3 longitudinal pigmented bands, median one continuous throughout most of body, lateral ones along bases of dorsal cirri in anterior unmodified region; with epaulettes on tentacular segment and part of first setiger----------**A. prismaticus**

### *Autolytus alexandri* Malmgren, 1867

*Autolytus alexandri* Malmgren, 1867, p. 37, pl. 7, fig. 39.—Verrill, 1881, p. 292, pl. 12, fig. 8.—Chamberlin, 1920, p. 12.—Friedrich, 1939, p. 123.—Hartman, 1942a, p. 13; 1944a, p. 338, pl. 13, fig. 11 (not pl. 13, fig. 2); 1945, p. 17, pl. 2, fig. 11.

*Stephanosyllis picta* Verrill, 1874a, pp. 43, 132, pl. 4, fig. 6; 1874b, pp. 361, 362, pl. 4, fig. 1 (not *Proceraea picta* Ehlers, 1864).

*Stephanosyllis ornata* Verrill, 1874a, p. 132 (not *Proceraea ornata* Verrill, 1873).

*Proceraea* (*Stephanosyllis*) *ornata* Webster and Benedict, 1887, p. 724 (not *Proceraea ornata* Verrill, 1873).

*Autolytus verrilli* Marenzeller, 1892, p. 416, pl. 19, fig. 4.—Augener, 1928, p. 726.—Wesenberg-Lund, 1947, p. 33, figs. 14, 15; 1950a, p. 18; 1950b, p. 52; 1951, p. 52.

*Description.*—Stem form: Length 4–12 mm., width without setae 0.6–0.8 mm., up to 35–64 segments. Antennae rather short, thick, subequal or median one up to twice the length of the lateral; tentacular cirri equal to or shorter than antennae, upper pair longer; first pair dorsal cirri as long as or longer than median antenna; rest of dorsal cirri rather irregular, unequal, at least some longer than body width, with cirrophores prominent. Distinct epaulettes on first two setigerous segments (or to end of setiger 4—Hartman, 1945). None showed sexual bud formation (sexual bud is formed between segments 25 and 26—Hartman, 1945). Color: In alcohol: Colorless or transversely banded with reddish to brownish granules, may be two bands per segment.

Female stolon (*Sacconereis*): A single specimen of 72 setigers, 16 mm. long, 1.2 mm. wide without setae, 3.5 mm. wide with swimming setae, consisting of 14 anterior, 26 middle, and 32 posterior setigers. Prostomium rounded, with four large dorsal eyes, three antennae rather short, subequal; two pairs tentacular cirri of nearly same length as antennae; dorsal cirri of anterior part of unequal length but all much longer than body width. Thick epaulettes extending on first three setigers. The stolon, with swimming setae and filled with

eggs, was dredged in 27 fathoms February 18, 1950. (A 2-lobed egg mass is carried ventrally—Wesenberg-Lund, 1947.)

Male stolon (*Polybostrichus*): No specimens taken from Point Barrow. A specimen taken in plankton at Portage Bay, Alaska, was 12 mm. long, 1.5 mm. wide without setae, 4 mm. wide including swimming setae, with 61 setigers consisting of 14 anterior, 36 median, and 11 posterior segments. Prostomium similar to *A. fallax*; two pairs tentacular cirri, upper pair longer. First pair dorsal cirri on first setiger very long, similar to median antenna (achaetous—Wesenberg-Lund, 1947); dorsal cirri in anterior region long, unequal; in middle region short, about one-third length of elongated parapodial lobes. Large epaulettes on first three setigers.

*New records.*—Arctic Alaska: Off Point Barrow base, 16.7–123.5 fms., up to 15 miles from shore, on bottoms of stones, worm tubes, and various combinations of mud, pebbles, gravel, stones, rocks, large perforated rocks, with bryozoans, hydroids, shells, and worm tubes (17 stations, 53 specimens). West Coast North America: *Albatross* surface station, Portage Bay, Alaska; San Juan Channel, Washington Sound, 25 fms., Pettibone, 1940. East Coast North America: Off Labrador, 30–40 fms., *Blue Dolphin* Expedition, 1949; Woods Hole region, Massachusetts, Pettibone, 1950.

*Distribution.*—Scattered records in the Arctic: Arctic Alaska, Greenland, Spitsbergen, Franz Josef Land, Barents Sea. Also Iceland; Labrador to North Carolina; Bering Sea to Washington. In low water to 123.5 fathoms; sexual forms at surface.

### *Autolytus fallax* Malmgren, 1867

Figure 29, *c–f*

? *Polybostrichus longosetosus* Oersted, 1843, p. 183, pl. 5, figs. 62, 67, 71.—Treadwell, 1937, p. 28.

*Autolytus fallax* Malmgren, 1867, p. 33, pl. 6, fig. 41.—Ditlevsen, 1929, p. 17.

? *Autolytus longisetosus* Malmgren, 1867, p. 34, pl. 7, fig. 38.

*Autolytus prolifer* Augener, 1913, p. 258; 1928, p. 724.—Wesenberg-Lund, 1947, p. 19, figs. 8, 9 (part; not *Nereis prolifera* Müller, 1788).

*Autolytus prismaticus* Wesenberg-Lund, 1947, p. 24 (part; not *Nereis prismatica* Fabricius, 1780).

*Description.*—Stem form: Length 3–18 mm., width without setae 0.3–0.7 mm., up to 45–78 segments. Median antenna and first pair dorsal cirri very long; lateral antennae and upper tentacular cirri about half as long; lower pair tentacular cirri and second pair dorsal cirri shorter, about twice the length of the following cirri; rest of dorsal cirri short, less than half the body width and extending only slightly beyond the setae, subequal. Short epaulettes (a pair of shallow, semicircular raised areas) on tentacular segment only. Of 68 specimens of the stem form, 45 showed bud formation of the sexual stolons, the

head of the bud forming between setigers 13 and 14; 6 were broken after setiger 13, 5 consisted of 13 setigers plus a definite posterior growing zone, and 12 consisted of 36 setigers or less and showed no sign of bud formation. Of the 45 specimens showing bud formation, 18 were young buds (sex?) showing four eyes and rudiments of head appendages; 17 were developing male stolons as indicated especially by the developing forked palps (at first, one part of fork about one-half the length of the other), large median antenna, and large dorsal tentacular cirri; the male buds consisted of a variable number of setigers (14–26 plus a definite growing zone, or 32–42 and tapered gradually to an attenuated posterior end); 10 were developing female buds as indicated by the developing three subequal antennae and the absence of forked palps; the female buds consisted of 40–65 setigers. Color: In alcohol: Two dorsolateral, longitudinal dark bands just dorsal to bases of dorsal cirri (almost all specimens showed at least faint bands). In life: Anterior part pale yellowish with dark dorsolateral bands, posterior part orange. Tubes: Thin, tough, transparent, on hydroids as *Lafoeina maxima* Levinsen; either on the surface or surrounded by the sessile hydrothecae of the hydroid colony.

Female stolon (*Sacconereis*): Length 5–15 mm., width without setae 0.5–1 mm., width including swimming setae 3.5–4 mm., up to 26–51 segments. Body widest in median region, tapering slightly anteriorly and more so posteriorly, forming an attenuated tail region; divided into three regions composed of 6 anterior unmodified setigers, 13–18 modified setigers with long, iridescent swimming setae, and 3–27 posterior unmodified setigers. Prostomium short, broad, one pair eyes dorsolateral, one pair larger ones ventrolateral, both with lenses; antennae long, stout, subequal or median one slightly longer than lateral pair. Upper two pairs tentacular cirri similar to dorsal cirri of following segments, with a third pair of short, ventral, tentacular cirri (about length of prostomium) and a pair of small, ventral, achaetous lobes. Dorsal cirri about as long as body width. Pair of shallow semicircular epaulettes on tentacular segment only. Pyriform-shaped egg sac carried on ventral surface in region of setigers 10–18, the egg mass flattened or slightly concave on side toward body, the narrower end of lobe anterior, the eggs orange-colored (in life). Color: In alcohol: Colorless, transparent, may be dusky posteriorly or somewhat dusky throughout. Two female stolons with eggs inside body dredged in 75 fms. October 11, 1949; females with egg sacs taken from vertical plankton hauls in 13 fathoms March 29, April 15, May 17, 1950; female with egg sac containing developing embryos dredged in 5 fathoms January 25, 1950.

Male stolons (*Polybostrichus*): Length 7–9 mm., width without setae 0.8–1 mm., width including swimming setae 2 mm., 43–66 seg-

ments, with body regions of 6 anterior, 27–30 middle, 9–10 posterior setigers, tapering gradually posteriorly. Prostomium short, wide, with a pair of eyes dorsolateral, a larger pair ventrolateral, all with lenses; palps bifurcated about basal third, the two branches subequal; very long, stout median antenna and very small lateral antennae anterior and medial to dorsal pair of eyes. Three pairs tentacular cirri with anterior dorsal pair similar to dorsal cirri, anterior ventral pair shorter than prostomial length, posterior dorsal pair very large, similar to median antenna, with a pair of achaetous knobs at their ventral bases. Dorsal cirri of anterior setigers about as long as body width, those of modified region about as long as the elongated, paddle-like parapodial lobes, those of posterior, taillike region short, digitiform. Shallow semicircular epaulettes on tentacular segment only. Color: In alcohol: Rusty brown, darkest on anterior part or colorless except anterior part. In life: Yellowish green. Taken in plankton, near shore, September 10, 1949; dredged in 27 fathoms February 18, 1950.

*Remarks.*—As referred to under the systematic discussion of *Autolytus*, the stem form of *A. fallax* has been incorrectly referred to *A. prolifer* by Augener (1913, 1928) and Wesenberg-Lund (1947, 1950). The two may be distinguished by the different positions of the sexual buds, the greater length of the dorsal cirri in *A. prolifer*, and the color markings. The sexual stolons of *A. fallax* have been confused with *A. prismaticus* (see discussion above).

*New records.*—Arctic Alaska: Eluitkak Pass, Elson Lagoon near Point Barrow, 5–6.6 fms., mud, in tubes associated with hydroid *Lafoëina maxima* Levinsen; Point Barrow base, washed ashore, on same hydroid; off Point Barrow base, 5–75.5 fms., up to 8 miles from shore, on bottoms of mud, stones, and various combinations of mud, gravel, stones, rocks, large perforated rocks, with bryozoans, hydroids including *Lafoëina maxima*, and shells (16 stations, 85 specimens); sexual stages from plankton near shore to 75.5 fms. (7 stations, 22 specimens). Cape Smyth, Point Barrow Expedition, winter, 1883 (1 male, 2 females with egg sacs). East Coast North America: Off Labrador, 25–60 fms., *Blue Dolphin* Expeditions, 1949, 1951.

*Distribution.*—Widely distributed in the Arctic: Alaskan and Canadian Arctic, Greenland, Spitsbergen, Franz Josef Land, Novaya Zemlya. Also Faroes; Labrador. In low water to 75.5 fathoms; sexual stolons in plankton.

### *Autolytus prismaticus* (Fabricius, 1780)

Figure 29, *a*, *b*

*Nereis prismatica* ? Müller, 1776, p. 218.—Fabricius, 1780, p. 302; 1799, p. 177, pl. 4, figs. 17–20.

? *Polybostrichus longosetosus* Oersted, 1843, p. 183, pl. 5, figs. 62, 67, 71.

? *Autolytus longisetosus* Malmgren, 1867, p. 34, pl. 7, fig. 38.—Verrill, 1881, p. 292, pl. 12, fig. 10.—Moore, 1902, p. 274; 1909b, p. 134.

*Autolytus incertus* Malmgren, 1867, p. 35, pl. 6, fig. 40.

*Proceraea gracilis* Verrill, 1874a, pp. 43, 132, pl. 5, fig. 1; 1874b, pp. 361, 362, 370, 379, pl. 3, fig. 2.—Webster and Benedict, 1887, p. 723.

*Autolytus prismaticus* Marenzeller, 1892, p. 420.—Chamberlin, 1920, p. 12.—Augener, 1928, p. 725.—Annenkova, 1934, p. 322; 1938, p. 156.—Not Berkeley and Berkeley, 1938, p. 48; 1948, p. 68.—Gorbunov, 1946, p. 38.—Wesenberg-Lund, 1947, p. 24, figs. 10–12 (part).—? Hartman and Reish, 1950, p. 13.

*Autolytus trilineatus* Berkeley and Berkeley, 1945, p. 318, fig. 1, a–b; 1948, p. 69, fig. 100.

*Description.*—Stem form: Length 5–24 mm., width without setae 0.7–1 mm., up to 52–92 segments. Proportion of anterior appendages and dorsal cirri similar to *A. fallax*. Distinct epaulettes on tentacular segment and usually extending also on at least part of first setigerous segment. Of 7 specimens, 2 were without signs of bud formation, although the body was constricted more than normally between setigers 13 and 14; 4 showed sexual bud formation with the head developing between setigers 13 and 14; and 1 had 13 setigers with a newly regenerating posterior end. Color: In alcohol: Creamy white with three conspicuous, longitudinal, black or dark bands, the median one broader, less dense, continuous throughout body, the dorsolateral ones narrower, darker, at level of bases of dorsal cirri, often confined to anterior fourth or half of body.

Female stolon (*Sacconereis*): A specimen of 58 setigers, 9 mm. long, 1 mm. wide without setae, 3 mm. wide with swimming setae, with body regions of 6 anterior, 18 middle, and 34 posterior setigers. Epaulettes somewhat triangular, extending on tentacular and first setigerous segments. Otherwise as in *A. fallax*. Color: In alcohol: Shows the same characteristic pigmentation as the stem form, three longitudinal, black pigmented bands. Two female stolons with swimming setae and eggs massed inside body dredged in 5 and 6 fathoms August 6, 30, 1948. Male stolons (*Polybostrichus*): no specimens taken.

*Remarks.*—*Polybostrichus longosetosus* Oersted, the male stolon (this might well be the male stolon of *A. fallax*, see systematic discussion above), *Autolytus incertus* Malmgren, the female stolon, and *Proceraea gracilis* Verrill, the stem form, have been referred previously by Marenzeller (1892) to *A. prismaticus*. *A. trilineatus* Berkeley and Berkeley is herein referred to *A. prismaticus*; the description, including the characteristic three longitudinal bands, is in agreement. The record of *A. prismaticus* by the Berkeleys (1938, 1948) is doubted since the stem form agrees with *A. cornutus* or *A. prolifer* but not *A. prismaticus*; the sexual forms agree with *A. cornutus* or *A. prismaticus* in the number of six anterior unmodified setigers; they agree with *A.*

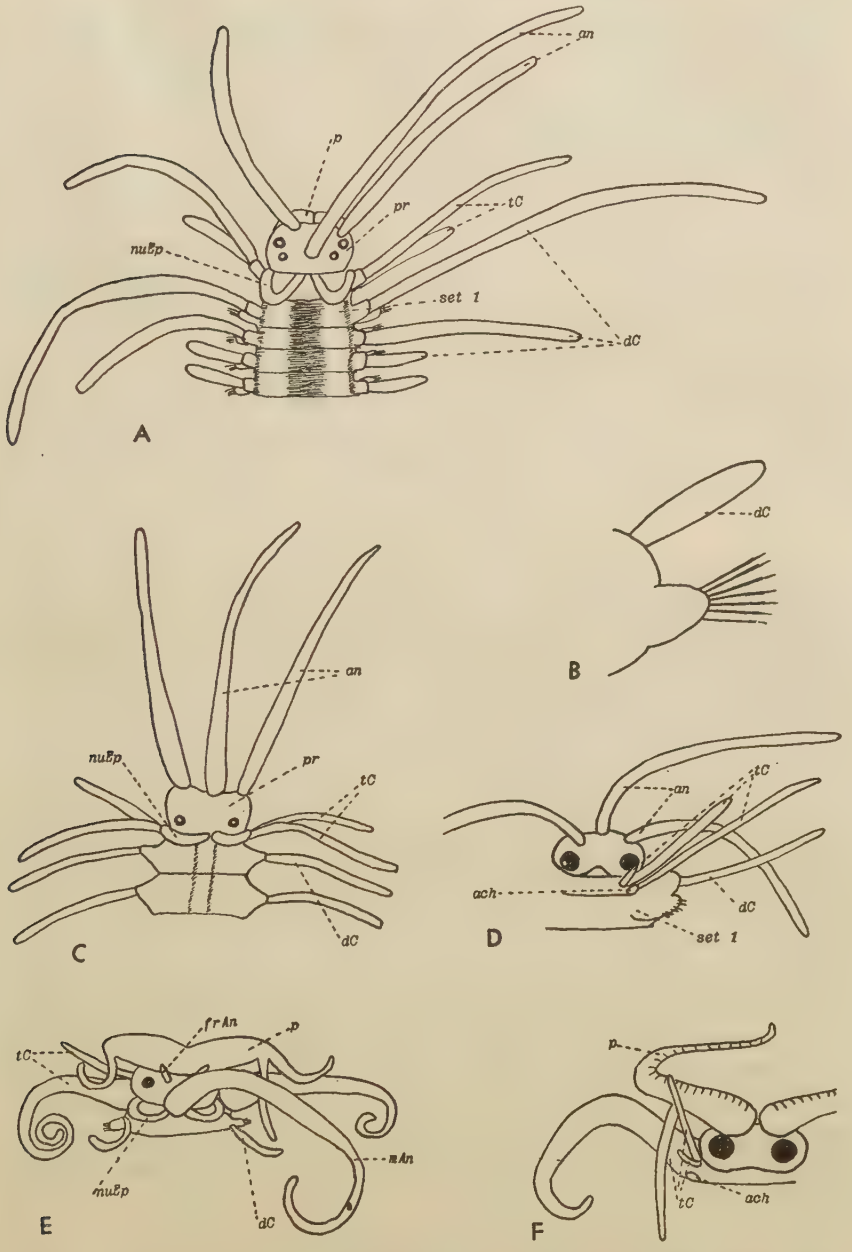


FIGURE 29.—Syllidae: *a*, *Autolytus prismaticus*, stem form, dorsal view anterior end; *b* same, parapodium; *c*, *Autolytus fallax*, female (*Sacconereis*) form, dorsal view anterior end; *d*, same, ventral view anterior end; *e*, *Autolytus fallax*, male (*Polybostrichus*) form, dorsal view anterior end; *f*, same, ventral view anterior end. (For explanation of symbols, see p. 210.)

261112—54——4

*cornutus* as to size, about one-third the size of the sexual stage of *A. prismaticus*, and in the absence of semicircular epaulettes (specimens examined through the kindness of the Berkeleys). The record of *A. prismaticus* from Oregon by Hartman and Reish (1950) is doubted since it is based on male stolons only.

*New records.*—Arctic Alaska: Eluitkak Pass, Elson Lagoon near Point Barrow, 6.6 fms., stony-mud; off Point Barrow base, 5–70 fms., up to 7 miles from shore, on bottoms of stones, and various combinations of mud, gravel, stones (7 stations, 11 specimens). East Coast North America: Lagoon Pond, Martha's Vineyard, Massachusetts, pile scrapings, Pettibone, 1951.

*Distribution.*—Widely distributed in the Arctic: Siberian, Alaskan, and Canadian Arctic, Greenland, Spitsbergen, Barents Sea, Novaya Zemlya. Also Iceland; Labrador to Massachusetts; Bering Sea to British Columbia (? Oregon); north Japan Sea. In low water to 267 fathoms; sexual forms at surface.

### Genus *Syllis* Savigny, 1818

Both species represented have the body elongate, slender, with numerous segments, flattened ventrally, arched dorsally, tapering slightly anteriorly and gradually posteriorly. Prostomium oval, wider than long; two palps wider basally, well separated except where their inner basal sides are fused (fig. 28, *c*). Dorsal cirri distinctly moniliform throughout body, alternately slightly longer and shorter. Ventral cirri digitiform, slightly shorter or longer than the parapodial lobes (fig. 28, *d*). Anterior end of extended proboscis with a smooth, chitinous rim, a single large, grayish dorsal tooth, with a ring of short, thick papillae, with a ring of 10 shorter papillae more basally. Male and female stolons or epitokous forms (*Chaetosyllis* Malmgren, 1867) developed from the posterior segments of the body; when fully developed consisting of small bilobed (or tetralobed) bulbous "head" with two pairs of eyes, a dorsal pair and a larger ventral pair, with a pair of short moniliform antennae; the first setigerous segment with neurosetae only, followed by a variable number of segments with additional long capillary swimming setae and usually a few unmodified posterior segments; stolons greatly distended with developing sex products; neurosetae, dorsal, ventral and anal cirri similar to those of stem form.

#### Key to the species of Syllis from Point Barrow

1. Compound neurosetae with short and long distal blades (fig. 28, *f*). Acicula of parapodia not particularly enlarged or protruding. Body segments very short ..... **S. cornuta**

   Compound neurosetae with terminal blades differing very slightly in length (fig. 28, *e*). From 1 to 4 very large acicula usually protrude somewhat from parapodial tip (fig. 28, *d*). Body segments longer ..... **S. fasciata**

### *Syllis (Ehlersia) cornuta* Rathke, 1843

FIGURE 28, f

*Syllis (Ehlersia) cornuta* Rathke, 1843, p. 164, pl. 7, fig. 12.—Malmgren, 1867, p. 43, pl. 7, fig. 45.—Southern, 1914, p. 37.—Fauvel, 1923, p. 267, fig. 100, g–i.—Augener, 1928, p. 718.—Monro, 1933, p. 34; 1937, p. 273; 1939b, p. 387.—Wesenberg-Lund, 1947, p. 6; 1950a, p. 15; 1950b, p. 46; 1951, p. 36.—Zatsepin, 1948, p. 115, pl. 31, fig. 4.

*Chaetosyllis oerstedi* Malmgren, 1867, p. 45, pl. 8, fig. 51 (epitokous form).

*Syllis oerstedi* Théel, 1879, p. 40, pl. 2, fig. 33; pl. 3, figs. 34, 35.—Annenkova, 1938, p. 150.—Gorbunov, 1946, p. 38.

*Syllis quaternaria* Moore, 1906a, p. 352, fig. (epitokous form).

*Syllis alternata* Moore, 1908, p. 321, fig. (p. 324); 1909a, p. 321.—Annenkova, 1938, p. 148.—Rioja, 1941, p. 691, pl. 3, figs. 1–9.—Berkeley and Berkeley, 1948, p. 77, fig. 115.

*Syllis (Ehlersia) heterochaeta* Moore, 1909a, p. 322, pl. 15, figs. 1–4.—Annenkova, 1938, p. 148.—Rioja, 1941, p. 694, pl. 4, figs. 7–10; Berkeley and Berkeley, 1948, p. 76, fig. 113.

*Ehlersia cornuta* Hartman, 1945, p. 15.

*Typosyllis alternata* Hartman, 1948, p. 21.

*Description.*—Stem form: Length 9–45 mm., width without setae 1–1.2 mm. Segments very short. Prostomium with two pairs of eyes, anterior pair larger, crescentric, with or without pair of small ocular spots anterior to lateral antennae. Moniliform dorsal cirri with about 14–22 articles (11–40). Neurosetae all compound, with longer and shorter blades, the longer ones 2–4 times longer than the shorter ones, with fine marginal fringe extending to near the tips (may give appearance of having a bidentate tip with a subterminal tooth); tips of short blades slightly hooked; tips of long, thin blades slightly hooked or with a slight knob (worn down?). In posterior segments, terminal blades of neurosetae not as long as in anterior segments. One specimen with developing stolon of 41 segments beginning on segment 75 of stem form. COLOR: In alcohol: (1) anterior segments dusky, then two narrow, reddish brown, transverse bands per segment on anterior and middle part of each segment; (2) rusty brown, with two darker bands per segment on part of body; (3) colorless.

Male and female stolons (*Chaetosyllis*): Length 8–19 mm., width without setae 1–1.2 mm., width including setae 4–5 mm., segments 30–70 (1 unmodified anterior segment, 24–62 modified segments with swimming setae, 0–7 unmodified posterior segments); dorsal cirri alternately longer and shorter, with 11–18 articles (14–25—Moore, 1906); capillary setae much longer than the dorsal cirri; neurosetae as in posterior segments of stem form (distal blades not as long as in anterior region of stem form); some segments showed the characteristic banding of two narrow bands per segment.

*Remarks.*—The types of *Syllis alternata* Moore from Alaska and *S. heterochaeta* Moore from California were examined and are herein referred to *S. cornuta* (suggested previously by Monro (1933) for *S. heterochaeta*). The description of *S. quaternaria* Moore (1906), the epitokous form taken at the surface, Point Barrow, Alaska, agrees with that of the stolons of *S. cornuta* collected by Dr. MacGinitie in a plankton haul.

*New records.*—Arctic Alaska: Stem form: Off Point Barrow base, 18.3–123.5 fms., up to 15 miles from shore, on bottoms of stones, mass of worm tubes, and various combinations of mud, pebbles, stones, gravel, rocks, large perforated rocks, and worm tubes (17 stations, 97 specimens). Sexual stolons: Off Point Barrow base, 1.6 miles from shore, vertical plankton haul of 13 fathoms through hole in ice, March 29, April 15, 1950 (12 specimens). West Coast North America: Strait of Juan de Fuca and Puget Sound, Washington, 30–107 fms., Pettibone. East Coast North America: Off Martha's Vineyard, 86, 134, and 146 fms.; off Salem, Massachusetts, 35 fms., U. S. Fish Commission.

*Distribution.*—Cosmopolitan. Widely distributed in the Arctic: Siberian and Alaskan Arctic, Greenland, Spitsbergen, Novaya Zemlya. Also Iceland, Norway to Madeira, Mediterranean; Red Sea, South Arabian coast, Persian Gulf; Indian Ocean (Zanzibar); off South Africa; Maine to North Carolina; north Japan Sea, Alaska to Panamá; South Pacific (Marquesas, Tahiti). In low water to 1,400 fathoms; sexual stolons in plankton.

### *Syllis (Typosyllis) fasciata* Malmgren, 1867

Figure 28, *c–e*

*Syllis* (*Typosyllis*) *fasciata* Malmgren, 1867, p. 43, pl. 7, fig. 47; pl. 8, fig. 52.—Augener, 1928, p. 719.—Fauvel, 1934b, p. 304.—Annenkova, 1934, p. 322; 1938, p. 150.—Gorbunov, 1946, p. 38.—Wesenberg-Lund, 1947, p. 10, fig. 2,a; 1950a, p. 16; 1950b, p. 47; 1951, p. 37.—Berkeley and Berkeley, 1948, p. 74, figs. 109, 110.—Zatsepin, 1948, p. 115, pl. 31, fig. 2.

*Syllis armillaris* Treadwell, 1937, p. 28 (not *Nereis armillaris* Müller, 1776; in USNM).

*Description.*—Stem form: Length 8–75 mm., width without setae 0.7–3 mm. Many small ones present; many broken ones and a number with regenerating posterior ends. Segments not as short as in *S. cornuta*. Prostomium with two pairs of eyes, anterior pair larger, crescentric. Moniliform dorsal cirri with about 24 articles (20–40; 12–17 in young specimens). Parapodia each with one to four large, pointed acicula usually protruding beyond distal tips of setal lobes. Neurosetae all compound, with terminal blades rather short, hooked, with tips entire; some setae may have blades broken

off (not to be confused with simple setae). Color: In alcohol: (1) pigmented with reddish-brown, one wide band per segment (darker on posterior part of band); more posteriorly two bands per segment, lighter anterior and darker posterior ones; then one band per segment; then without color (when mature, banded color pattern on the segments of the developing sexual stolon); (2) colorless, particularly in small specimens; (3) uniform brown mottling on anterior third of body (specimens from Washington). In life: Reddish rusty brown bands, one wide band or two narrower bands per segment, especially on the anterior fourth and posterior fourth (latter a developing stolon, with wide, orange-red bands). One specimen with developing stolon beginning on segment 71.

Sexual stolons (*Chaetosyllis*): Two male stolons, 34–37 segments (one unmodified anterior segment, 31–33 modified segments with swimming setae, 2 or 3 small, unmodified posterior segments); long swimming notosetae subequal to dorsal cirri; dorsal cirri of first unmodified segment broken off at cirrophores; darkly pigmented reddish brown dorsally and ventrally.

*New Records.*—Arctic Alaska: Stem form: Off Point Barrow base, 18.3–123.5 fms., up to 15 miles from shore, on bottoms of mud, stones, worm tubes, from breaking rocks and bryozoans, from interstices between pebbles and gravel covering tunicate, *Molgula* sp., from various combinations of mud, pebbles, stones, gravel, rocks, large perforated rocks, worm tubes, and shells (21 stations, 206 specimens). Male stolons: Off Point Barrow base, 1.6 miles from shore, vertical plankton haul of 13 fms. through hole in ice (March 29, 1950, 2 specimens). West Coast North America: Washington Sound, 17–21 fms., Pettibone. Canadian Arctic: Center Foxe Basin, 25–31 fms., Bartlett, 1927.

*Distribution.*—Widely distributed in the Arctic: Siberian, Alaskan, and Canadian Arctic, Baffin Bay, Greenland, Jan Mayen, Spitsbergen, Franz Josef Land, Novaya Zemlya, Kara Sea. Also Iceland, Faroes; Bering Sea to southern California; north Japan Sea, China. In low water to 378 fathoms; sexual stolons in plankton.

## Genus *Sphaerosyllis* Claparède, 1863

Represented by a single species from Point Barrow.

### *Sphaerosyllis erinaceus* Claparède, 1863

Figure 28, *m*

*Sphaerosyllis erinaceus* Claparède, 1863, p. 45, pl. 13, fig. 38 (fide Fauvel).—Southern, 1914, p. 20.—Fauvel, 1923, p. 302, fig. 115, q–r.—Annenkova, 1934, p. 322; 1938, p. 153.—? Rioja, 1943, p. 211, figs. 1–6.—Gorbunov, 1946, p. 38.—Zatsepin, 1948, p. 116, pl. 31, fig. 7.

*Sphaerosyllis latipalpis* Levinsen, 1882, p. 244.—Augener, 1928, p. 722, pl. 11, fig. 3; 1939, p. 140.—Wesenberg-Lund, 1947, p. 13, fig. 4; 1951, p. 38.
*Sphaerosyllis longicauda* Webster and Benedict, 1887, p. 720, pl. 3, figs. 35–39.—Eliason, 1920, p. 11, fig. 3.
*Oophylax minuta* Treadwell, 1937, p. 29, figs. 6, 7.
*Brania* sp. Hartman, 1944a, pl. 24, figs. 1, 2.

*Description.*—Length 2–4.5 mm., width without setae 0.3–0.5 mm., segments 22–37. Body linear, tapering slightly anteriorly and posteriorly, oval in cross section. Body, including parapodia, covered with small papillae and incrusted with fine, granular material. Prostomium subrectangular, wider than long, with six black eyes, four larger ones (each with a lens, arranged in transverse line or slightly concave arc near middle of prostomium) and two small anterior ones. Antennae subequal, bulbous basally, narrower distally. Paired antennae lateral to anterior eye spots; median antenna more posterior, nearly in line with the four larger eyes. Palps short, wide, rounded anteriorly; they may project more anteriorly, extending about the same length as the prostomium, with basal halves fused and distal halves separated by a narrow groove, or they may project more ventrally, extending only about half the length of the prostomium, and fused except for a small anterior indentation; ventrally the palps are not fused although they may be closely approximated, extending back to the level of the four large eyes. Tentacular segment not distinctly set off from the prostomium, with a single pair of tentacular cirri which are similar to the antennae. Dorsal cirri short, slightly longer than parapodial lobes and shorter than the setae, inflated basally, tapering to narrow tips; they may be similar in shape throughout body or they may be only slightly inflated basally in middle and posterior regions. Dorsal cirri lacking on setiger 2. Ventral cirri digitiform, slightly shorter than parapodial lobes. Anal cirri larger than dorsal cirri; anal segment with several larger papillae. Parapodial tip usually with a larger papilla. Neurosetae consisting of a single long, simple, tapering, curved upper seta, the rest compound with distal blades long, subequal, entire, hooked, and finely pectinate. Colorless in alcohol. Female (21 fathoms, September 9, 1948) with large, rounded eggs (larger in diameter than parapodial length) fastened to dorsal surface rather irregularly between setigers 8–24, one to four per segment, attached between neuropodia and dorsal cirri and just medial to the dorsal cirri; another female (36 fathoms, October 6, 1949) with large, oval-shaped developing larvae (developing setae visible) attached to the dorsal surface; swimming setae lacking (with swimming setae in male—Fauvel, 1923; swimming setae in both male and female beginning on setiger 8—Webster and Benedict, 1887; eggs on ventral base of feet—Wesenberg-Lund, 1947).

*Remarks.*—The type of *Oophylax minuta* Treadwell from Foxe Channel was examined and is herein referred to *Sphaerosyllis erinaceus;* although not mentioned in the original description, the specimen has a median antenna (seen with difficulty on the prepared slide); neurosetae include a simple seta in addition to the compound ones, setiger 2 lacks dorsal cirri. The type specimens of *S. longicauda* Webster and Benedict from Eastport, Maine, were examined also but they are unsatisfactory, being hardened, shrunken, and covered with crystals; the description is fairly complete and agrees with *S. erinaceus* as does the description by Augener of *S. latipalpis* Levinsen. The record by Rioja of *S. erinaceus* from México is questioned chiefly because of the position of the eyes.

*New records.*—Arctic Alaska: Off Point Barrow base, 16.7–75.5 fms., up to 8 miles from shore, on bottoms of stones and various combinations of gravel, stones, rocks, large perforated rocks, with bryozoans and hydroids (8 stations, 37 specimens). East Coast North America: Off Labrador, 25 fms., *Blue Dolphin* Expedition, 1949. Vineyard Sound, Massachusetts, surface, U. S. Fish Commission, August 3, 1881.

*Distribution.*—Widely distributed in the Arctic: Siberian , Alaskan, and Canadian Arctic, West Greenland, Spitsbergen. Also Iceland, Denmark, Ireland, English Channel, Baltic; Labrador to Massachusetts; Bering Sea; north Japan Sea; ? Mexico. In low water to 75.5 fathoms; sexual forms at surface.

### Genus *Exogone* Oersted, 1845

Both species represented are very small, slender, linear-elongate, tapered slightly anteriorly and more so posteriorly, flattened ventrally, arched dorsally. Body colorless, translucent (in alcohol). Prostomium oval to subrectangular, arched somewhat anteriorly, much wider than long; four eyes, with lenses, in trapezoidal arrangement; palps fused dorsally into a rounded or triangular mass, with or without a slight anterior notch; palps separated ventrally by wide depression. Tentacular segment short, more or less distinct, the anterior part of which may form a fold covering the posterior part of the prostomium. Dorsal cirri shorter than parapodial lobes, ovoid to somewhat conical. Ventral cirri digitiform, shorter than parapodial lobes. Neurosetae of three kinds: (1) upper one simple, slightly curved; (2) composite, with longer, slender, pointed blades; (3) composite, with short, hooked blades. Everted pharynx crowned with circle of papillae and single conical tooth. With swimming setae at maturity. Large eggs, embryos or young (up to five setigers, resembling the adult) attached to ventral surface of female.

## Key to the species of Exogone from Point Barrow

1. Antennae subequal. Tentacular cirri rudimentary, reduced to small knobs (fig. 28, *l*). Dorsal cirri lacking on setiger 2. Upper compound setae with rather short pointed blades ..... **E. naidina**

   Median antenna more than 4 times length of lateral antennae (fig. 28, *k*). Tentacular cirri only slightly smaller than the lateral antennae or dorsal cirri. Dorsal cirri present on all setigerous segments. Upper compound setae with long pointed blades ..... **E. dispar**

### *Exogone naidina* Oersted, 1845

FIGURE 28, *l*

*Exogone naidina* Oersted, 1845, p. 20, pl. 2.—Augener, 1939, p. 140.—Zatsepin, 1948, p. 116, pl. 31, fig. 8.

*Exogone gemmifera* Pagenstecher, 1862, p. 267, pl. 25; pl. 26, figs. 1, 2, 6–8.—McIntosh, 1908, p. 151, pl. 59, figs. 5, 6.—Southern, 1914, p. 17.—Eliason, 1920, p. 11.—Fauvel, 1923, p. 305, fig. 117, a–d.—Annenkova, 1934, p. 322; 1938, p. 154.—Rioja, 1943, p. 223, figs. 38–46.—Gorbunov, 1946, p. 38.—Thorson, 1946, p. 35, fig. 8.—Berkeley and Berkeley, 1948, p. 79, fig. 118.—Hartman and Reish, 1950, p. 13.

*Description.*—Length 3.5–5 mm., width without setae 0.3 mm., segments 32–36. Palps form rounded mass, 1.4–2 times length of prostomium. Antennae shorter than palps, subequal or median one slightly longer, clavate, inserted anterior to eyes in almost a straight line. Tentacular cirri very small, reduced to small knobs. Dorsal cirri lacking on setiger 2. Neurosetae of each parapodium consisting of one simple, curved upper seta, one upper composite seta with longer pointed blade, and four or five composite setae with short, hooked blades. Female (21 fathoms, September 15, 1948) without special swimming setae, with large eggs attached to ventral surface (between segments 11–25, one to three per segment) medial to ventral cirri and between parapodia. Another female (57 fathoms, October 11, 1949) with eggs on ventral surface of segments 13–21 (mostly four per segment); eggs large, nearly touching. (Swimming setae on females with internal ova, absent in females with ova attached to ventral surface, two eggs per segment—Thorson, 1946.)

*New records.*—ARCTIC ALASKA: Off Point Barrow base, 16.7–123.5 fms., up to 16 miles from shore, on bottoms of rocks, stones, worm tubes, and various combinations of mud, gravel, stones, rocks, large perforated rocks, with worm tubes, bryozoans, hydroids; on female *Hyas coarctatus alutaceus* (14 stations, 82 specimens).

*Distribution.*—Alaskan and Siberian Arctic; Denmark, Ireland, Great Britain to Madeira, Mediterranean; Bering Sea to Mexico; north Japan Sea. In low water to 123.5 fathoms; sexual stages at surface.

***Exogone dispar* (Webster, 1879)**

FIGURE 28, *k*

*Paedophylax dispar* Webster, 1879a, p. 223, pl. 4, fig. 49; pl. 5, figs. 50–55; 1879b, p. 110; 1886, p. 138.—Sumner, 1913, p. 615.
*Paedophylax longiceps* Verrill, 1879, p. 170; 1881, p. 320, pl. 12, fig. 2; 1882, p. 370.—Andrews, 1891, p. 281.
*Paedophylax longicirris* Webster and Benedict, 1887, p. 722, pl. 3, figs. 46–50.
*Exogone lourei* Berkeley and Berkeley, 1938, p. 44, figs. 6–12; 1948, p. 79, fig. 117.—Rioja, 1941, p. 703, pl. 3, figs. 14–21; 1943, p. 224.
*Exogone dispar* Hartman, 1942a, p. 11; 1944a, p. 338, pl. 24, fig. 9; pl. 25, fig. 5; 1945, p. 16, pl. 2, figs. 7, 9, 10; 1951, p. 40.

*Description.*—Anterior ends of 3 specimens only (up to 8 mm. long, 45 setigers—Berkeley and Berkeley, 1938). Palps form a conical mass, about twice length of prostomium. Antennae inserted between and slightly in front of eyes; median antenna longer, usually reaching nearly to end of palps (may be not much longer than prostomium), lateral antennae short, ovoid. Tentacular cirri slightly smaller than lateral antennae and dorsal cirri. Dorsal cirri present on all setigerous segments, including setiger 2. Neurosetae on each parapodium consisting of one simple curved upper seta (may have a delicate thread coming off subterminally in some specimens), one to four composite setae with long terminal capillary blades, and three to nine composite setae with short, hooked blades.

*Remarks.*—The specimens were compared with the cotypes of *Paedophylax dispar* from New Jersey. The types of *P. longicirris* Webster and Benedict from Eastport, Maine, were examined also and the peculiar hairlike process on some of the simple setae was noted. This also occurs on some of the simple setae of the specimens from Point Barrow. *P. longiceps* Verrill has previously been referred to *P. dispar* by Sumner (1913). The description of *E. lourei* Berkeley and Berkeley from British Columbia agrees with that of *E. dispar.*

*New records.*—ARCTIC ALASKA: Off Point Barrow base, 36–70 fms., up to 7.5 miles from shore, on bottoms of stones, gravel, large perforated rocks (2 stations, 3 specimens). WEST COAST NORTH AMERICA: Strait of Juan de Fuca, Washington, shore, Pettibone, 1940. EAST COAST NORTH AMERICA: Woods Hole region, Massachusetts, Pettibone, 1950, 1951. Maine, Massachusetts, New Jersey, low water to 14 fms., U. S. Fish Commission.

*Distribution.*—Arctic Alaska to Mexico; Maine to southwestern Florida. In low water to 70 fathoms; sexual stages at surface.

## Genus *Eusyllis* Malmgren, 1867

Both species represented are flattened ventrally, arched dorsally, tapering both anteriorly and posteriorly, very fragile, breaking up

easily and losing their antennae and dorsal cirri readily. Prostomium subrectangular to suboval, wider than long; four eyes fairly large, in trapezoidal arrangement, the anterior pair larger; palps broad, thick, oval to squarish, fused at their bases only and well separated distally, and may be curled ventrally or longitudinally like flopping ears; lateral antennae about 1.5 times the prostomial length; median antenna about twice the length of the lateral antennae (fig. 28, *g*). Upper tentacular cirri as long as median antenna, ventral pair much shorter. Ventral cirri thick, oval, about same size and length as parapodial lobes or may be slightly shorter (first pair not enlarged, similar to the following). Neuropodia short and plump, with neurosetae all composite except on the last setigers where there may be a simple, entire, upper seta and a simple, bidentate, lower seta; blades of composite setae rather short, hooked, distinctly bidentate, finely spinous on the cutting edge; shaft distally spinous (fig. 28, *i*). At maturity, with long capillary swimming setae. Proboscis with two rows of soft papillae, a proximal and a distal row of 10 papillae per row; inside the distal row, a chitinous lining provided with a large, triangular, dorsal tooth and a denticled, circular margin (fig. 28, *g*, *h*).

### Key to the species of Eusyllis from Point Barrow

1. Cirrophores of dorsal cirri not prominent. Tentacular segment with a wide crescent-shaped nuchal lobe covering the posterior part of the prostomium (fig. 28, *g*) ..... **E. blomstrandi**

   Cirrophores of dorsal cirri prominent, as long as the neuropodia. Tentacular segment short, without nuchal lobe ..... **E. magnifica**

#### *Eusyllis blomstrandi* Malmgren, 1867

FIGURE 28, *g–i*

*Eusyllis blomstrandi* Malmgren, 1867, p. 40, pl. 6, fig. 43.—Fauvel, 1923, p. 293, fig. 112,h–m.—Augener, 1928, p. 721.—Annenkova, 1938, p. 153, fig. 6.—Wesenberg-Lund, 1947, p. 11, fig. 3; 1950a, p. 16; 1950b, p. 48; 1951, p. 37.—Berkeley and Berkeley, 1948, p. 84, fig. 126.

*Eusyllis monilicornis* Malmgren, 1867, p. 41, pl. 6, fig. 44.—Verrill, 1881, p. 319.—Zatsepin, 1948, p. 116, pl. 31, fig. 6,b.

? *Eusyllis phosphorea* Hartman, 1942a, p. 7; 1944a, pp. 334, 338, pl. 25, fig. 4.

*Syllis monilicornis* Théel, 1879, p. 41, pl. 3, fig. 39.

*Eusyllis tubifex* McIntosh, 1908, p. 173, figs.—Southern, 1914, p. 32 (not *Syllis tubifex* Gosse, 1855).

*Eusyllis bloemstrandi* Friedrich, 1939, p. 122.

*Typosyllis collaris* Hartman, 1948, p. 23, fig. 6,a–c.

*Description.*—Length 7–32 mm., width without setae 0.8–1.2 mm., segments 50–124. Antennae, tentacular cirri, anterior dorsal cirri, and long anal cirri irregularly annulated, especially distally, more or less smooth basally; the more posterior dorsal cirri only indistinctly annulated or smooth. First few dorsal cirri may be longer than body width, especially the first pair which may be the longest appendage;

rest of dorsal cirri shorter than body width, tapering gradually. Tentacular segment with wide, short, crescent-shaped collar or nuchal fold covering posterior part of prostomium, may be inconspicuous and protruding or rather low, somewhat contracted. Composite setae similar throughout, with distal blades short, differing only slightly in length. Chitinous lining of proboscis light or dark gray or light amber-colored; dorsal tooth dark bluish gray; circular margin finely denticled. Epitokous female (Elson Lagoon, August 6, 1948) with large eggs massed in most of body segments, consisting of 16 anterior unmodified setigers, 25 setigers with long swimming setae, and 5 unmodified setigers (swimming setae begin on setiger 13—Wesenberg-Lund, 1947). Color: In alcohol: Colorless or tannish, slightly greenish anteriorly. In life: Orange or yellowish. May form definite hardened mucous tubes. Luminescent.

*Remarks.*—The type of *Typosyllis collaris* Hartman (1948) was examined and is herein referred to *E. blomstrandi;* the dorsal cirri are not distinctly annulated throughout the body as they would be in a *Typosyllis.* There is nothing in Verrill's description of *E. phosphorea,* dredged from St. George's Bank, to distinguish it from *E. blomstrandi;* according to Hartman (1942, p. 7) the type is unsatisfactory.

*New records.*—Arctic Alaska: Eluitkak Pass, Elson Lagoon near Point Barrow, 6.6 fms.; Point Barrow base, washed ashore; off Point Barrow base, 13.3–123.5 fms., up to 15 miles from shore, on bottoms of stones, masses of worm tubes, and various combinations of mud, pebbles, gravel, stones, rocks, large perforated rocks, with worm tubes, bryozoans, hydroids, shells, and on female crab *Hyas coarctatus alutaceus* (24 stations, 175 specimens). Bering Sea: Robert White, 1879. West Coast North America: Washington and Puget Sounds, 20–46 fms., Pettibone. East Coast North America: Off Labrador, 15–30 fms., *Blue Dolphin* Expeditions, 1949, 1951.

*Distribution.*—Widely distributed in the Arctic: Siberian and Alaskan Arctic, West Greenland, Spitsbergen, Franz Josef Land, Barents Sea, Novaya Zemlya, Kara Sea. Also Iceland, Faroes, Ireland to Madeira, Mediterranean; Labrador to Maine; Bering Sea to Washington; north Japan Sea. In low water to 444 fathoms; epitokes at surface.

### *Eusyllis magnifica* (Moore, 1906)

*Pionosyllis magnifica* Moore, 1906b, p. 223, pl. 10, figs. 9–11; 1908, p. 325.—Annenkova, 1938, p. 152.

*Description.*—Atokous specimen 52 mm. long, 2.5 mm. in greatest width without setae, 152 segments (in pieces, complete?). Epitokous specimen (18 fathoms, September 16, 1948) broken up and not quite complete, with larger eyes, consisting of 161 segments, 99 mm. long,

4 mm. wide without setae, 9 mm. wide including long swimming setae. Two atokous specimens from Washington 43–48 mm. long, 1.5–2 mm. wide without setae. Median antenna, tentacular cirri and some of anterior dorsal cirri somewhat annulated, especially distally; rest of dorsal cirri smooth. Some of anterior dorsal cirri longer than body width; rest shorter than body width, subulate, thick basally, tapering distally, on prominent cirrophores which may be as long as parapodial lobes. Tentacular segment very short, without nuchal collar. Blades of neurosetae all rather short. In anterior parapodia, blades of upper neurosetae somewhat longer than the lower ones; on rest of parapodia, blades of neurosetae only slightly different in length. Chitinous lining of proboscis and dorsal tooth light to darker amber-colored or transparent; circular anterior border with coarse, triangular denticles (when transparent, difficult to see denticled border). Swimming setae begin on setiger 24 (on setiger 19 in specimen from Portage Bay, Alaska). Color: In alcohol: Flesh.

*Remarks.*—The specimens were compared with the type of *Pionosyllis magnifica* Moore (1906) from Port Townsend, Washington. It is herein referred to *Eusyllis* since the composite neurosetae have rather short blades which differ only slightly in length, the proboscis has a proximal and a distal row of papillae, and the anterior circular border is denticled (difficult to see when the chitinous lining is transparent).

*New records.*—Arctic Alaska: Off Point Barrow base, 18.3 fms., pebbles-mud (1 station, 2 specimens). West Coast North America: *Albatross* surface station, Portage Bay, Alaska; Washington Sound, Pettibone.

*Distribution.*—Arctic Alaska to Washington; north Japan Sea. In 16 to 302.8 fathoms; epitokes at surface.

## Genus *Pionosyllis* Malmgren, 1867

### *Pionosyllis compacta* Malmgren, 1867

Figure 28, *j*

*Pionosyllis compacta* Malmgren, 1867, p. 40, fig. 48.—Augener, 1928, p. 722.—Annenkova, 1934, p. 322.

*Description.*—Anterior ends only of two small specimens, up to 1.5 mm. wide without setae (8–10 mm. long, 1 mm. wide—Malmgren, 1867). Body flattened ventrally, arched dorsally, fragile, with segments crowded. Prostomium subrectangular, wider than long; four eyes rather large, in trapezoidal arrangement; palps squarish, fused basally, widely separated distally. Tentacular segment without nuchal collar. Antennae, tentacular, and dorsal cirri smooth, without articulations, filiform to rather thick, breaking off readily; most of

dorsal cirri shorter than the body width. Ventral cirri thick, pointed, almost as long as parapodial lobes. Neurosetae all composite, distal blades distinctly bidentate, finely spinous along cutting edge; blades of upper setae longer, becoming gradually shorter in lower part of bundle with upper ones about twice the length of lower ones. Proboscis with a distal row of 10 papillae; transparent chitinous lining with a translucent bluish-gray dorsal tooth, with distal rim smooth. Color: In alcohol: Irregularly dotted with black pigment both dorsally and ventrally. (Epitokous forms have capillary setae beginning on segments 12–15—Malmgren, 1867.)

*New records.*—Arctic Alaska: Off Point Barrow, 36–78 fms., up to 15 miles from shore, on bottoms of rocks, stones, and worm tubes (2 stations, 2 specimens).

*Distribution.*—Arctic Alaska; Spitsbergen; Bering Sea. In low water to 78 fathoms.

## Family Nereidae

Prostomium distinct, with four eyes, two frontal antennae, two biarticulated palps (fig. 30, *a*). Four pairs tentacular cirri; buccal or tentacular segment usually apodous and achaetous. Parapodia usually biramous (except first two pairs), with dorsal and ventral cylindrical cirri, two or three notopodial ligules and one neuropodial ligule (fig. 30, *b*, *c*). Setae usually compound spinigers and falcigers (fig. 30, *d–g*). Pair of anal cirri. Proboscis eversible, with pair of terminal, horny, falcate jaws and usually with horny denticles or paragnaths arranged in eight groups on two rings, a basal or oral ring and a distal or maxillary ring (fig. 30, *h*, *i*). At maturity usually with a pelagic epitokous or heteronereis stage.

Represented by a single genus and two species.

### Genus *Nereis* Cuvier, 1817

### Subgenus *Nereis* Linné, 1758

Both species have the body smooth, elongate, cylindrical, attenuated posteriorly, with numerous segments. Prostomium of the typical nereid form. Tentacular segment achaetous, over twice the length of the following segments; tentacular cirri short, fairly uniform in length, the upper one only slightly longer than the others (may reach setiger 2). Parapodia biramous, with two subequal notopodial ligules (remaining so throughout the body, the upper one not getting larger or longer than the lower one), a single neuropodial ligule ventral to the conical setigerous neuropodial lobe (fig. 30, *b*, *c*). Notosetae homogomph spinigers (fig. 30, *g*); in more posterior segments with some homogomph falcigers with blunt asymmetrical reduced appendages (fig. 30, *e*). Neurosetae homogomph and

heterogomph spinigers (fig. 30, *f*) and heterogomph falcigers with hooked end-pieces (fig. 30, *d*). Proboscis with paragnaths all chitinous, conical, separated in groups, occurring on both rings (fig. 30, *h*, *i*). Distal ring of paragnaths: Area II (dorsolateral)—oblique group of two or three rows; area III (medioventral)—small transverse group; area IV (ventrolateral)—arched mass. Basal ring of paragnaths: Area V (mediodorsal)—0. At maturity, with epitokous stage, eyes enlarged; 14–19 anterior prenatatory setigers; modified natatory setigers with parapodial lobes compressed, flattened anteroposteriorly, developing foliaceous lamellar plates, with numerous paddlelike swimming setae; in males, first seven dorsal cirri enlarged and club-shaped, first five or six ventral cirri modified, and dorsal cirri of natatory setigers crenulate on lower margin; in females, dorsal and ventral cirri not modified or crenulate.

### Key to the species of Nereis (Nereis) from Point Barrow

1. Parapodial ligules short, thick, evenly rounded (fig. 30, *b*). Body uniformly purplish or reddish brown, not banded. Paragnaths of distal ring: Area I (mediodorsal)—2 in tandem (rarely 1 or 3); paragnaths of basal ring: Area VI (dorsolateral)—4 in square or cross (rarely 3 or 5); areas VII–VIII (ventral)—1–2 irregular rows of larger paragnaths, with several rows of small ones, diminishing in size posteriorly (2–3 irregular rows of subequal paragnaths in subspecies *occidentalis*). Male epitokes with 16 and females with 17–19 prenatatory setigers ..... **N. (N.) pelagica**

   Parapodial ligules triangular to conical, gradually tapering to a broad tip (fig. 30, *c*). Body transversely banded reddish brown or violet. Paragnaths of distal ring: Area I—0 or 1; paragnaths of basal ring: Area VI—6–10 or more in oval mass; VII–VIII—continuous row of larger paragnaths followed by a wide band of small subequal ones (fig. 30, *h*, *i*). Male epitokes with 14 and females with 16 prenatatory setigers ..... **N. (N.) zonata**

#### *Nereis (Nereis) pelagica* Linné 1758

FIGURE 30, *a*, *b*

*Nereis pelagica* Linné, 1758, p. 654.—Malmgren, 1867, p. 47, pl. 5, fig. 35.—Webster and Benedict, 1884, p. 718; 1887, p. 724.—Moore, 1903, p. 431.—McIntosh, 1908, p. 268, figs.—Sumner, 1913, p. 619.—Southern, 1914, p. 80.—Eliason, 1920, p. 29.—Chamberlin, 1920, p. 14.—Fauvel, 1923, p. 336, fig. 130, a–f.—Augener, 1928, p. 712.—Monro, 1930, p. 106.—Annenkova, 1934, p. 322; 1937, p. 162; 1938, p. 158.—Treadwell, 1937, p. 29.—Okuda, 1939, p. 230.—Friedrich, 1939, p. 123.—Hartman, 1940, p. 225, pl. 35, fig. 52; 1944a, p. 335; 1948, p. 26.—Berkeley and Berkeley, 1943, p. 130; 1948, p. 66, fig. 96, a–b.—Thorson, 1946, p. 64, fig. 29.—Zatsepin, 1948, p. 119, pl. 30, fig. 2.—Wesenberg-Lund, 1950a, p. 19, pl. 6, figs. 26a, 27a; 1950b, p. 53; 1951, p. 39.

*Heteronereis grandifolia* Rathke, 1843, p. 155, pl. 7, figs. 13, 14.—Malmgren, 1865, p. 108, pl. 11, fig. 15 (part—female heteronereid, not male).

*Nereis neonigripes* Hartman, 1936b, p. 471, fig. 48.

*Nereis arctica* Treadwell, 1937, p. 30.

*Nereis pelagica* var. *occidentalis* Hartman, 1945, p. 20, pl. 4, figs. 1–6; 1951, p. 46.

*Nereis pelagica neonigripes* Hartman and Reish, 1950, p. 17.

*Description.*—Length 60–155 mm., width 5–14 mm. See key. Color: In alcohol: Iridescent, uniformly purplish or reddish brown (narrow white intersegmental lines); ligules of parapodial lobes may be darkly pigmented (var. *neonigripes*); tips of dorsal cirri may be black.

*New records.*—Arctic Alaska: Off Point Barrow base, up to 12.1 miles from shore, 18–87 fms., on various combinations of stones, gravel, rocks, large perforated rocks (8 stations, 10 specimens). Spitsbergen: Spitsbergen Sea, U. S. S. *Alliance*, August, 1881, surface (heteronereid). Bering Sea: *Albatross* Sta. at Nikolski, Bering Island, 1892, and Sta. 3496, 56°32′ N., 169°45′ W., 41 fms., 1893; St. George Island, Pribilofs, 1913, 1914, low tide and 30 fms., and St. Paul Island, Pribilofs, lagoon reef, 1915, Hanna; St. Paul Island, Wm. Palmer, 1890. Southwestern Alaska: *Albatross* Sta., Unalaska, Aleutians, 1888; Akutan Pass, Chica Islands, 1872; Kiska Harbor, sandy-mud, 9–12 fms., 1873; Anchorage, Big Koniuji Islands, Shumagin, 6–20 fms., sand and rocks; Port Moller, Alaska Peninsula, beach to 17 fms., sand, 1874; Killisnoo, 1897; Chiniak Bay, Kodiak Island, 1880; all collected by Dall. Gulf of Alaska: *Albatross* Sta., at Observation Island, Cordova, Alaska, 1914. Southeastern Alaska: Sitka, 1932. West Coast North America: *Albatross* Sta. 89a, Denman, British Columbia, 1914, and Sta. 3466, off Washington, 48°18′30″ N., 123°22′ W., 56 fms., 1891. Washington and Puget Sounds, low tide to 166 fms. (very common), Pettibone. East Coast North America: Off Labrador, 7–60 fms., *Blue Dolphin* Expeditions, 1949, 1951; Woods Hole region, intertidal and dredged, Pettibone, 1950, 1951; Gulf of St. Lawrence, New Brunswick, Nova Scotia, Bay of Fundy, Maine, Massachusetts, Rhode Island, Connecticut, Long Island Sound, shore to 250 fathoms and surface, U. S. Fish Commission.

*Distribution.*—Widely distributed in the Arctic: Siberian, Alaskan, and Canadian Arctic, Davis Strait, Greenland, Spitsbergen, Barents Sea, Novaya Zemlya, Kara Sea. Also Iceland, Faroes, Norway to Mediterranean; Hudson Bay to Long Island Sound; Bering Sea to Panamá; north Japan Sea, Japan; South Atlantic (Tristan da Cunha, Kerguelen, Magellan Straits). In low water to 609 fathoms; epitokes at surface. Variety *occidentalis* Hartman: North Carolina, Florida, Louisiana, Texas, Puerto Rico; intertidal.

### *Nereis (Nereis) zonata* Malmgren, 1867

Figure 30, *c, h, i*

*Heteronereis grandifolia* Malmgren, 1865, p. 108, pl. 11, fig. 16 (part—male heteronereid, not female; not *H. grandifolia* Rathke, 1843).

*Nereis zonata* Malmgren, 1867, p. 46, pl. 5, fig. 34.—Théel, 1879, p. 42.—Wirén, 1883, p. 402.—Ditlevsen, 1911, p. 419, pl. 28, fig. 6; pl. 30, figs. 18, 22.—

Fauvel, 1914, p. 177, pl. 14, figs. 1–17; 1923, p. 338, fig. 130, g–n (part).—Augener, 1928, p. 713.—Annenkova, 1931, p. 203; 1932, p. 134; 1934, p. 322; 1937, p. 162; 1938, p. 158.—Friedrich, 1939, p. 123.—Berkeley and Berkeley, 1943, p. 130.—Gorbunov, 1946, p. 38.—Zatsepin, 1948, p. 119, pl. 30, fig. 3.—Hartman, 1948, p. 25.—Hartman and Reish, 1950, p. 17.—Wesenberg-Lund, 1950a, p. 20, pl. 6, figs. 26b, 27b; 1950b, p. 55; 1951, p. 41.

*Description.*—Length 30–125 mm., width 7 mm. See key. Color: In alcohol: Reddish or rusty brown or violet wide transverse bands; anterior fourth of segment without color.

*Remarks.*—*Nereis procera* Ehlers, 1868, originally described from the Gulf of Georgia, British Columbia, has been referred to *N. zonata* by Fauvel, 1914. In *N. procera* the body is long, slender, extremely attenuated posteriorly; the notopodial ligules of the anterior setigers are triangular, subequal; those of the median and posterior regions have the upper notopodial ligules larger than the lower one (may be nearly twice the size); the paragnaths of areas VII and VIII are in a wide, continuous area with no especially enlarged anterior row; male epitokes with 51 and females with 59 prenatatory setigers. It may be that the variety *procera* of Fauvel refers to a different species from that of *N. procera* Ehlers.

*New records.*—Arctic Alaska: Eluitkak Pass, Elson Lagoon near Point Barrow, 13 fms., gravel; off Point Barrow base, 21–78 fms., on bottoms of gravel, stones, small rocks, with shells and worm tubes (8 stations, 12 specimens). Canadian Arctic: Ellesmere Island, U.S.S. *Alert*, 1950, J. Peter Johnson (epitoke). East Greenland: 74°04′ N., 17°58′ W., 120 fms., Norcross-Bartlett Expedition, 1931. East Coast North America: Off Labrador, 9–100 fms., mud, *Blue Dolphin* Expeditions, 1950, 1951.

*Distribution.*—Widely distributed in the Arctic: Siberian, Alaskan, and Canadian Arctic, Baffin Bay, Davis Strait, Greenland, Norway, Spitsbergen, Franz Josef Land, Barents Sea, Novaya Zemlya, Kara Sea. Also Iceland, Faroes; Hudson Bay to Labrador; Bering Sea to Oregon; north Japan Sea. In low water to 439 fathoms; epitokes at surface. Variety ? *procera* Fauvel (1914, 1923; not Ehlers, 1868): English Channel to Mediterranean. Variety *persica* Fauvel: Red Sea, South Arabian Coast, Persian Gulf, Indian Ocean.

## Family Nephtyidae

Body elongated, subtetragonal in cross section. Prostomium small, somewhat flattened, angulate, with four small antennae (fig. 30, *j*). First segment rudimentary, with setae and usually with short dorsal and ventral tentacular cirri. Parapodia biramous, with rami well separated, with small dorsal cirri on lower sides of notopodia; with branchiae (interramal cirri) between the two rami, cirriform, sickle-shaped or foliaceous; with simple setae arranged in fan-shaped bundles;

ventral cirri short, conical, or foliaceous; with anterior and posterior lamellae more or less developed (fig. 30, *k–n*). A single anal cirrus. Proboscis eversible, strong, muscular, a pair of horny jaws within the pharynx, with rows of soft papillae and a crown of terminal, bifid papillae. Move rapidly with undulating motion; usually in sand or mud.

Represented by a single genus and four species.

### Genus *Nephtys* Cuvier, 1817

The four species represented have numerous segments (65–150), tapered posteriorly and slightly anteriorly. Prostomium pentagonal to quadrate, with antennae conical, subequal, or more ventral pair slightly larger, without eyes, with pair of nuchal papillae at postectal margins (may be inverted or everted; fig. 30, *j*). Tentacular or first segment with both dorsal and ventral tentacular cirri. Parapodial rami with anterior lamellae rudimentary or lacking, with posterior lamellae developed in varying degrees, with branchiae recurved (convex side toward lateral side of body, fig. 30, *k–n*). Ventral cirri short, conical. Proboscis with 22 long terminal papillae (10 pairs bifid, and a single dorsal and ventral one), with 22 longitudinal rows of subterminal papillae, four to eight per row, decreasing in size basally.

#### Key to the species of Nephtys from Point Barrow

1. Branchiae cirriform, sickle-shaped, with dorsal cirri digitiform (fig. 30, *l*, *n*). Proboscis with a long median dorsal papilla ..... 2
   Branchiae foliaceous or cirriform and inflated basally, rudimentary or absent on last 15–30 segments, with dorsal cirri flattened, triangular, pointed (fig. 30, *k*, *m*). Proboscis without a long median dorsal papilla; proximal surface of proboscis ridged (may be low tubercles in *N. discors*) ..... 3
2. Branchiae begin on setigers 3 or 4, continuing to almost posterior end; acicular lobes rounded or slightly bilobed, especially anteriorly (fig. 30, *l*). Neuropodial postsetal lamellae extend well beyond the acicular lobes, bilobed or irregularly sinuous. Setae very long, flowing. Proximal surface of proboscis smooth or furrowed ..... **N. longosetosa**
   Branchiae begin on setigers 5–8, rudimentary on last 20–30 segments. Acicular lobes deeply bilobed in anterior and median regions (fig. 30, *n*). Neuropodial postsetal lamellae about same length as or only slightly surpassing the acicular lobes. Setae shorter. Proximal surface of proboscis tubercled. **N. ciliata**
3. Branchiae begin on setiger 6, inflated basally, digitiform, recurved distally (fig. 30, *m*). Acicular lobes unequally bilobed, rounded in posterior region. Postsetal lamellae of anterior and median regions large, foliaceous, extending well beyond the acicular lobes; in posterior region, extend only slightly beyond ..... **N. discors**
   Branchiae begin on setigers 8–14, thick, wide, foliaceous (fig. 30, *k*). Acicular lobes rounded to conical. Postsetal lamellae shorter than, as long as, or only slightly longer than the acicular lobes ..... **N. paradoxa**

261112—54——5

### *Nephtys longosetosa* Oersted, 1843

FIGURE 30, *l*

*Nephtys longosetosa* Oersted, 1843, p. 195, pl. 6, figs. 75, 76.—Hartman, 1944a, p. 339, pl. 15, fig. 7.

*Nephthys longisetosa* not Malmgren, 1865, p. 106, pl. 12, fig. 20.—Eliason, 1920, p. 32.

*Nephthys coeca* Murdoch, 1885, p. 153 (part; includes var. *longisetosa*; not *Nereis caeca* Fabricius, 1780).

*Nephthys longosetosa* Fauvel, 1923, p. 367, fig. 143, f–h.—Monro, 1928, p. 82.—Annenkova, 1937, p. 163; 1938, p. 162.—Friedrich, 1939, p. 123.—Berkeley and Berkeley, 1943, p. 130; 1948, p. 52, fig. 76.—Gorbunov, 1946, p. 38.—Wesenberg-Lund, 1950a, p. 21; 1950b, p. 60; 1951, p. 44.

*Nephthys ciliata* forma *longosetosa* Augener, 1928, p. 698.

*Nephthys ciliata* Treadwell, 1937, p. 28 (part; not *Nereis ciliata* Müller, 1789).

*Description.*—Length up to 170 mm., width without setae 6 mm. Tentacular cirri subequal to antennae. Notopodial postsetal lamellae unequally bilobed (a rather large upper lobe and small lobe just above the dorsal cirri), extending slightly or not beyond the acicular lobes. Neuropodial postsetal lamellae of anterior region rounded, entire, extending beyond the acicular lobes; those of the median and posterior regions large, bilobed or irregularly sinuous on ventral side, extending well beyond the acicular lobes. COLOR: In alcohol: Without color, or dusky, especially anteriorly.

*New records.*—ARCTIC ALASKA: Eluitkak, Elson Lagoon near Point Barrow; Point Barrow base, washed ashore; off Point Barrow base, 1.7–25 fms., on bottoms of gravel, stones, and mud (7 stations, 16 specimens); Cape Lisburne, 5–7 fms., Dall. BERING SEA: 60°16′ N., 167°41′ W., Stoney, 1884; 66°45′ N., 166°35′ W., 10 fms., Dall, 1880. CANADIAN ARCTIC: Duckett Cove, Hurd Channel, Melville Peninsula, Foxe Channel, Bartlett, 1933. EAST COAST NORTH AMERICA: Off Labrador, 8 fms., *Blue Dolphin* Expedition, 1949.

*Distribution.*—Widely distributed in the Arctic: Siberian, Alaskan, and Canadian Arctic, Greenland, Spitsbergen, Franz Josef Land, Barents Sea, White Sea, Novaya Zemlya, Kara Sea. Also Iceland, Faroes to France; to Maine; to Lower California and Panamá; north Japan Sea; Strait of Magellan. In low water to 528 fathoms.

---

FIGURE 30.—Nereidae: *a*, *Nereis pelagica*, dorsal view anterior end; *b*, same, middle parapodium; *c*, *Nereis zonata*, middle parapodium; *d*, compound heterogomph falciger; *e*, compound homogomph falciger; *f*, compound heterogomph spiniger; *g*, compound homogomph spiniger; *h*, *Nereis zonata*, dorsal view extended proboscis showing areas of paragnaths; *i*, same, ventral view. Nephtyidae: *j*, *Nephtys paradoxa*, dorsal view anterior end; *k*, same, middle parapodium, anterior view; *l*, *Nephtys longosetosa*, middle parapodium, anterior view; *m*, *Nephtys discors*, middle parapodium, anterior view; *n*, *Nephtys ciliata*, middle parapodium, anterior view. (For explanation of symbols, see p. 210.)

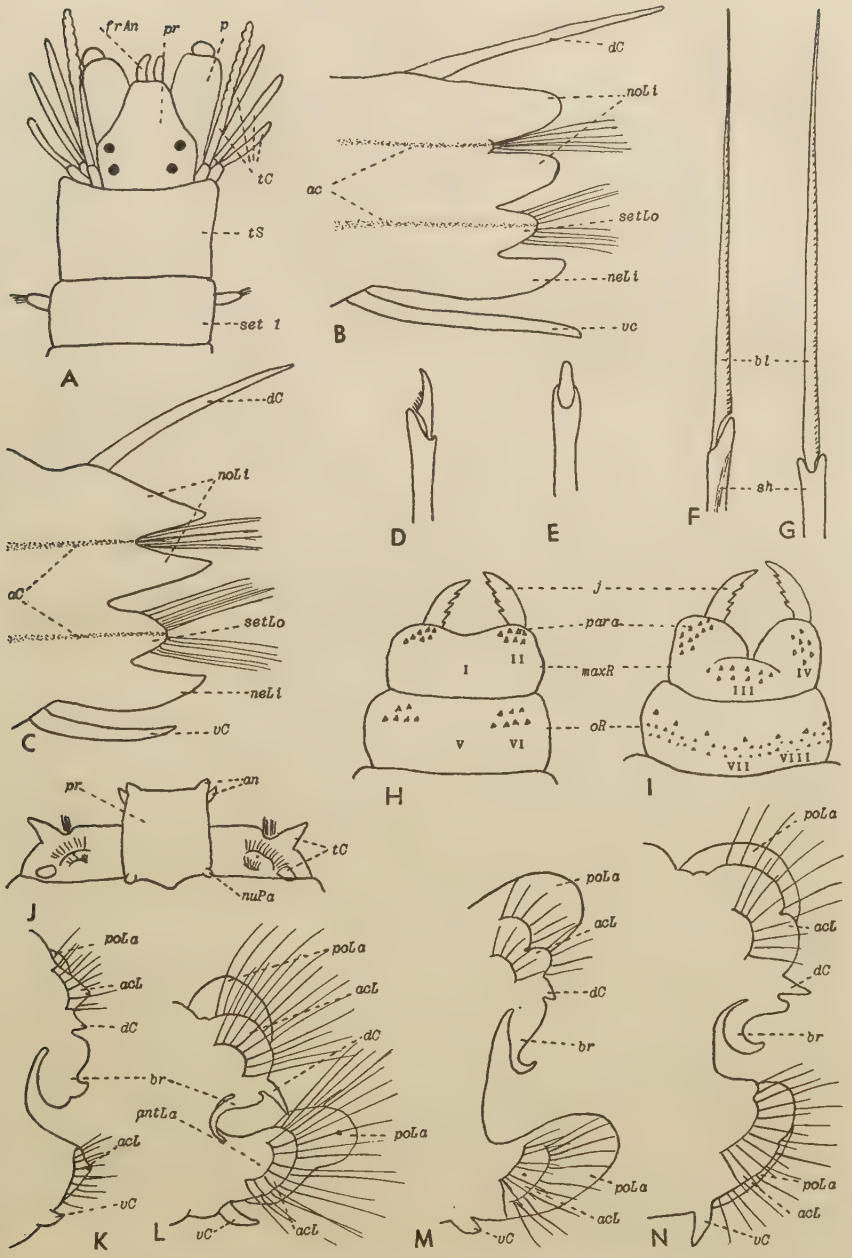


FIGURE 30.—For explanation see facing page.

### *Nephtys ciliata* (Müller, 1789)

FIGURE 30, *n*

*Nereis ciliata* Müller, 1789, p. 14, pl. 89, figs. 1–4.

*Nephthys ciliata* Malmgren, 1865, p. 104, pl. 12, fig. 17.—Webster and Benedict, 1887, p. 709.—Moore, 1903, p. 433.—Eliason, 1920, p. 31.—Fauvel, 1923, p. 371, fig. 145, a–b; 1933, p. 39.—Augener, 1928, p. 699.—Gustafson, 1936, p. 7.—Treadwell, 1937, p. 28 (part).—Annenkova, 1937, p. 164; 1938, p. 162.—Friedrich, 1939, p. 123.—Gorbunov, 1946, p. 38.—Thorson, 1946, p. 69, figs. 32, 33.—Berkeley and Berkeley, 1948, p. 55, fig. 82.—Wesenberg-Lund, 1950a, p. 21; 1950b, p. 59; 1951, p. 45.

*Nephthys caeca* Murdoch, 1885, p. 153 (*part;* includes var. *ciliata*).—Moore, 1911, p. 243 (not *Nereis caeca* Fabricius, 1780).

*Nepthys ciliata* Chamberlin, 1920, p. 9.

*Nepthys hudsonica* Chamberlin, 1920, p. 10, pl. 2, figs. 4–6.

*Nephtys ciliata* Hartman, 1944a, pp. 335, 339, pl. 15, fig. 9 (as *N. incisa*, not fig. 10 (=*N. caeca*)); 1950, p. 95.

*Description.*—Length 100–300 mm., width without setae 9–11 mm. Tentacular cirri subequal to antennae. Acicular lobes deeply bilobed in anterior and median regions; rounded or slightly bilobed in posterior region. Postsetal lamellae of both notopodia and neuropodia rounded, entire, short, about same length as or only slightly surpassing the acicular lobes. COLOR: In alcohol: White, tannish, or anterior third reddish brown or buff. (According to G. E. MacGinitie, the pellets of this worm indicate that it is a detritus feeder.)

*New records.*—ARCTIC ALASKA: Off Point Barrow aero radio mast, 10 fms.; off Point Barrow base, up to 8 miles from shore, 6–75.5 fms., on bottoms of mud and various combinations of mud, pebbles, gravel, stones, rocks, large perforated rocks, and shells (18 stations, 37 specimens). SIBERIA: Plover Bay, Dall, 1880. ALASKA: Chiachi Island, 20 fms., mud; Round Island, Coal Harbor, 6–8 fms., mud, 1872; Port Mulgrove, Yakutat Bay, 6–40 fms., 1874; Port Etches, 12–18 fms., 1874; all collected by Dall. WEST COAST NORTH AMERICA: Washington and Puget Sounds, low water to 83 fms. (common), Pettibone. EAST COAST NORTH AMERICA: Off Labrador, 6–95 fms., *Blue Dolphin* Expeditions, 1949, 1950, 1951; off Nova Scotia, Bay of Fundy, Maine, Massachusetts, 14–110 fms., U. S. Fish Commission.

*Distribution.*—Widely distributed in the Arctic: Siberian, Alaskan, and Canadian Arctic, Greenland, Spitsbergen, Norway, Barents Sea, White Sea, Novaya Zemlya, Kara Sea. Also Iceland, Faroes to France; to Massachusetts; to Southern California; to Japan, China. In low water to 500 fathoms.

### *Nephtys discors* Ehlers, 1868

FIGURE 30, *m*

*Nephthys discors* Ehlers, 1868, p. 626, pl. 23, figs. 39, 40.—Verrill, 1873, p. 103.—Webster and Benedict, 1887, p. 709.

*Nephtys discors* Hartman, 1938c, p. 9, pl. 1, figs. 2, 3; 1950, p. 96.

*Nephtys rickettsi* Hartman, 1938b, p. 153; 1950, p. 97.

*Description.*—Length 115–300 mm., width without setae 9–12 mm. Dorsal pair tentacular cirri about half as large as ventral pair. Branchiae begin on setiger 6, at first a small swelling on the lower side of the base of the flattened, triangular dorsal cirrus, gradually becoming larger; where best developed, they are inflated on the basal half, with the distal half more slender, digitiform and slightly recurved or hooked; they are smaller and rudimentary only on posterior half of body. Notopodial acicular lobes of anterior and middle region unequally bilobed, the upper one wider and shorter and the ventral one narrower and longer; rounded in posterior region. Neuropodial acicular lobes slightly bilobed in anterior region; very low and rounded in middle and posterior regions (not very distinct from posterior lamellae). Color: In alcohol: Brownish.

*Remarks.*—The type of *N. rickettsi* Hartman from Alaska was compared with a specimen of *N. discors* from Bay of Fundy and is herein referred to the latter species.

*New records.*—Arctic Alaska: Point Barrow base, washed ashore; off Point Barrow base, up to 12.1 miles from shore, 24.7–123.5 fms., on bottoms of mud, gravel-mud, stones and large perforated rocks, and mass of worm tubes (5 stations, 5 specimens). West Coast North America: Puget and Washington Sounds, 70–83 fms., mud (3 specimens), Pettibone, 1938, 1939. East Coast North America: Bay of Fundy, U. S. Fish Commission.

*Distribution.*—Alaskan Arctic to southern California; Bay of Fundy to Maine. In 24–268 fathoms.

### *Nephtys paradoxa* Malm, 1874

Figure 30, j, k

*Nephthys paradoxa* Malm, 1874, p. 78, pl. 1, fig. 2.—Fauvel, 1923, p. 375, fig. 146, f–i.—Augener, 1928, p. 701.—Gustafson, 1936, p. 7.—Annenkova, 1938, p. 163.—Friedrich, 1939, p. 123.—Berkeley and Berkeley, 1943, p. 130.—Wesenberg-Lund, 1950a, p. 22; 1950b, p. 61; 1951, p. 47.

*Nephthys phyllobranchia* McIntosh, 1885, p. 164, pl. 26, fig. 10; pl. 27, fig. 3; pl. 14, A, figs. 12, 13.

? *Nephthys brachycephala* Moore, 1903, p. 431.—Annenkova, 1937, p. 164; 1938, p. 162.—Zatsepin, 1948, p. 121, pl. 30, fig. 9.

*Nephtys paradoxa* Hartman, 1944a, pp. 335, 339, pl. 15, fig. 6; 1950, p. 111.

*Nephtys phyllobranchia* Hartman, 1950, p. 111.

*Description.*—Length 150–200 mm., width without setae 8–13 mm. Dorsal pair tentacular cirri reduced to a tubercle, smaller than ventral pair. Branchiae begin on setigers 11–13 (8–14), very short, triangular at first, gradually becoming larger; where best developed, they are flat, wide foliaceous, weakly to distinctly concave; they are small, nearly absent on the last 15–30 segments. The anterior acicular lobes are rounded; those of the middle and posterior regions are conical, pointed. The postsetal lamellae in the anterior region are

slightly longer than the acicular lobes; they are shorter than the conical acicular lobes in the middle and posterior regions. COLOR: In alcohol: Dusky, especially anteriorly.

*Remarks.*—Augener (1928) indicated that he was of the opinion that *N. phyllobranchia* McIntosh should be referred to *N. paradoxa;* Hartman (1950) stated that they are separable by only slight differences. The type of *N. brachycephala* Moore from Japan is unsatisfactory (dried, when received); the description is in agreement with *N. paradoxa.*

*New records.*—ARCTIC ALASKA: Off Point Barrow base, up to 12.1 miles from shore, 23.5–123.5 fms., on bottoms of mud and mass of worm tubes (2 stations, 3 specimens).

*Distribution.*—Widely distributed in the Arctic: Siberian, Alaskan, and Canadian Arctic, Greenland, Spitsbergen, Norway, Barents Sea, Kara Sea. Also Iceland, Faroes to France; off Delaware; Japan. In 3.3–4,001 fathoms.

## Family GLYCERIDAE

Body rounded, elongated, attenuated at both ends, not divided into two regions, either only uniramous or only biramous. Segments bi- or tri-annulate. Prostomium sharply conical, wide basally, with a pair of nuchal organs, transversely annulated, ending in four minute antennae distally (fig. 31, *a*). Small, globular dorsal cirri; larger ventral cirri (fig. 31, *b, c*); two anal cirri. Branchiae present or absent. Notosetae simple capillaries; neurosetae compound spinigers. Proboscis eversible, long, clavate, with numerous, small papillae (proboscidial organs) and four dark, falcate, horny jaws each with an attached, embedded, rodlike aileron (fig. 31, *d*). Epitoky affects entire individual (parapodial lobes become more elongate, setae longer and more numerous).

Represented by a single species from Point Barrow.

### Genus *Glycera* Savigny, 1818

#### *Glycera capitata* Oersted, 1843

FIGURE 31, *a–d*

*Glycera capitata* Oersted, 1843, p. 196, pl. 7, figs. 87, 88, 90–94, 96, 99.—Ehlers, 1913, p. 503.—Fauvel, 1923, p. 385, fig. 151, a–e.—Augener, 1928, p. 734.—Monro, 1930, p. 115; 1936, p. 114.—Annenkova, 1937, p. 165; 1938, p. 164.—Støp-Bowitz, 1941, p. 186, fig. 1; 1948b, p. 4.—Hartman, 1944a, pp. 336, 339; 1948, p. 28; 1950, p. 76, pl. 11, figs. 1–4.—Gorbunov, 1946, p. 38.—Zatsepin, 1948, p. 117, pl. 31, fig. 9.—Berkeley and Berkeley, 1948, p. 38, fig. 52.—Hartman and Reish, 1950, p. 20.—Wesenberg-Lund, 1950a, p. 23; 1950b, p. 64; 1951, p. 49.

*Glycera setosa* Oersted, 1843, p. 198, pl. 7, figs. 89, 95, 97 (epitokous form).

*Glycera nana* Johnson, 1901, p. 411, pl. 10, fig. 103.—Berkeley and Berkeley, 1948, p. 37, figs. 50, 51.

*Glycera lapidum* Fauvel, 1914, p. 205; 1923, p. 386, fig. 151, *f–m*; 1934a, p. 41.—Eliason, 1920, p. 36, fig. 6.—Treadwell, 1937, p. 32.—Støp-Bowitz, 1941, p. 191, fig. 2; 1948b, p. 7.

*Description.*—Length 80 mm., width without setae 6 mm. (length up to 150 mm.—Hartman, 1950). Segments usually triannulate (may be biannulate, a slightly longer anterior ring at the level of the parapodia and a shorter posterior ring; the former may be subdivided, thus triannulate; the latter may also be somewhat divided, thus tetra-annulate). Conical prostomium with 8–16 annuli (often difficult to count accurately). Dorsal cirri small, globular, inserted well above the parapodia. Ventral cirri wide, conical. Parapodia biramous throughout; notopodia represented by a short, conical presetal lobe and a small bundle of simple capillary setae; neuropodia with a longer, conical presetal lobe and a fan-shaped group of compound spinigerous setae; a single short, wide, rounded postsetal lobe common to both notopodia and neuropodia (thus two conical anterior lobes and a single postsetal lobe). The relative length of the parapodial lobes may be variable, associated with the epitokous condition, as indicated by Hartman (1950). Proboscis with two kinds of papillae, numerous, long, cylindrical, slender ones, and fewer, larger, short, subspherical ones; aileron of jaws with a long lateral prolongation. Color: In alcohol: Brownish.

*Remarks.*—Monro (1930) referred *Glycera lapidum* Quatrefages to *G. capitata*; they have been separated on minor and apparently variable characters; Fauvel (1914, 1923) regarded them as mere varieties. Hartman (1950) referred *G. nana* Johnson to *G. capitata.*

*New records.*—Arctic Alaska: Off Point Barrow base, 15 miles from shore, 78.2 fms., on bottom of small rocks with worm tubes (1 station, 1 specimen). Northwest Greenland: Off Conical Rock, 20–40 fms., 1938; 1 mile northwest Conical Rock, 1940; west side Wolstemholm Island, 1940; all collected by Bartlett. East Coast North America: Off Nova Scotia, Maine, Massachusetts. Rhode Island, low water to 410 fms., U. S. Fish Commission. Alaska: Eastern Harbor, Sitka, gravelly-mud, 15 fms., 1874; between Pinnacle and Ulakhta, Unalaska, 16 fms., 1874; Captain's Harbor, Unalaska, 25–75 fms., coarse sand, 1874; all collected by Dall. *Albatross* Sta. Herendeen Bay, 1890. Washington: *Albatross* Sta. 2876, 48°33′ N., 124°53′ W., 59 fms., and Sta. 2879, 48°53′ N., 125°53′ W., 34 fms., 1888; Strait of Juan de Fuca, Washington and Puget Sounds, low water to 165 fms., Pettibone.

*Distribution.*—Widely distributed in the Arctic: Siberian, Alaskan, and Canadian Arctic, Baffin Bay, Davis Strait, Greenland, Spitsbergen, Norway, Barents Sea, White Sea, Novaya Zemlya, Kara

Sea. Also Iceland, Faroes to Portugal, Azores, Madeira, Mediterranean, Adriatic; to Rhode Island; to Gulf of California and Mexico; Japan; South Atlantic and Antarctic. In low water to 1,889 fathoms; epitokous phase in surface layers.

## Family Goniadidae

Body elongated, more or less attenuated at both ends, divided into two regions, anterior region with uniramous parapodia (fig. 31, *f*) and long, wider posterior region with biramous parapodia (fig. 31, *g*). Segments uniannulate. Prostomium sharply conical, transversely annulated, ending distally in four small antennae (fig. 31, *e*). Elongated conical dorsal and ventral cirri (fig. 31, *f*, *g*). Two anal cirri. Notosetae simple; neurosetae compound. Branchiae absent. Proboscis eversible, long, cylindrical, with terminal papillae and proboscidial organs, a pair of larger, dentate, dark horny macrognaths, and a circlet of many smaller H- or Y-shaped micrognaths. Epitoky involves only biramous portion.

Represented by a single species from Point Barrow.

### Genus *Glycinde* F. Müller, 1858

#### *Glycinde wiréni* Arwidsson, 1898

Figure 31, *e–g*

*Goniada nordmanni* Wirén, 1883, p. 403, pl. 30, figs. 4, 5, pl. 32, figs. 1, 2; (not *Eone nordmanni* Malmgren, 1867).

*Glycinde wiréni* Arwidsson, 1898, p. 53, pl. 3, figs. 48, 49.—not Moore, 1908, p. 348 (=*G. armigera* Moore; in USNM).

*Description.*—Length up to 45 mm., width without setae 2.5 mm., width including setae 5 mm., 120 segments. Anterior region rounded, tapering sharply to pointed anterior end; posterior two-thirds wider, more flattened, tapering gradually posteriorly. Prostomium with 10 annuli; two pairs of small deeply-set eyes, one pair in basal ring, one pair in distal ring (may be obscure). Anterior uniramous region consisting of 30–32 (31 in Arwidsson) setigers, with presetal lobe wide basally, narrowed abruptly to a lanceolate tip; postsetal lobe wide, conical; pre- and postsetal lobes as well as dorsal and ventral cirri subequal in length; a fan-shaped bundle of compound, spinigerous neurosetae. Posterior biramous region with shorter notopodia distinctly separated from neuropodia. Notopodium a short, rounded lobe with a short dorsal cirrus and a short, protruding presetal lobe; notosetae few in number, acicular, hooked at tip, with long pointed hood. Neuropodia with short conical, postsetal lobe, subequal to ventral cirrus; presetal lobe wide basally with a lanceolate narrower tip, longer than postsetal lobe; neurosetae as in anterior region,

except they may be longer and more numerous. Proboscis without chevrons; proboscidial organs (horny, yellow, spinous processes) of several kinds arranged in longitudinal series. Color: In alcohol: Uniformly greenish brown or somewhat banded with one wide, dark-greenish-brown band per segment; iridescent.

*New records.*—Arctic Alaska: Off Point Barrow base, up to 4 miles from shore, 23 to 29.1 fms., on various combinations of mud, sand, gravel, stones, rocks, shells (3 stations, 5 specimens).

*Distribution.*—Arctic Alaska to Bering Sea. In 23 to 29 fathoms.

## Family Lumbrineridae

Body elongate, cylindrical, tapered slightly anteriorly and more strongly posteriorly, superficially resembling oligochaetes. Prostomium conical to rounded, with a pair of nuchal organs on posterior margin, without antennae or palps (fig. 31, *h*). First two segments apodous and achaetous, without tentacular cirri. Without dorsal and ventral cirri. Two to four anal cirri. Parapodia uniramous. Proboscis eversible, with dark, chitinous, well-developed masticatory apparatus consisting of a pair of ventral mandibles and four pairs of maxillary plates (fig. 31, *i*, *j*).

Represented by a single species from Point Barrow.

### Genus *Lumbrineris* Blainville, 1828

#### *Lumbrineris fragilis* (O. F. Müller, 1776)

Figure 31, *h–n*

*Lumbricus fragilis* Müller, 1776, p. 216; 1788, p. 22, pl. 22, figs. 1–3.
*Lumbrinereis fragilis* Malmgren, 1867, pl. 14, fig. 83.—Chamberlin, 1920, p. 15.—Eliason, 1920, p. 33.—Berkeley and Berkeley, 1943, p. 130.
*Lumbriconereis minuta* Théel, 1879, p. 42, pl. 4, figs. 57–59.—Fauvel, 1911, p. 22.—Augener, 1928, p. 732.—Wesenberg-Lund, 1950a, p. 28; 1950b, p. 71.
*Lumbriconereis fragilis* Fauvel, 1923, p. 430, fig. 171, *k*, *l*.—Augener, 1928, p. 730, pl. 11, fig. 5.—Annenkova, 1937, p. 167; 1938, p. 167.—Gorbunov, 1946, p. 39.—Thorson, 1946, p. 74.—Zatsepin, 1948, p. 124, pl. 31, fig. 14.—Wesenberg-Lund, 1950a, p. 27; 1950b, p. 69; 1951, p. 55.
*Lumbrineris fragilis* Hartman, 1944a, pp. 335, 340.

*Description.*—Length 150–250 mm., width without setae up to 7 mm., width with setae 12 mm. Prostomium conical, pointed. First two achaetous segments about equal to the following segments or the first one slightly longer. Parapodia without branchiae, with presetal lobe short, rounded; postsetal lobe in anterior region of body slightly longer, rounded, diagonally truncate; in middle and posterior regions of body, postsetal lobe extended somewhat dorsally, somewhat digitiform; with arched limbate setae with fine capillary tips, dark amber-colored on basal half, on first 60–100 setigers; with simple (not compound), hooded, hooked setae, dark amber-colored basally, beginning

on setigers 15–24 (22–35 or more); on young specimens, the hooded, hooked setae may begin on more anterior segments; acicula black. With two anal cirri on ventral side of short, disclike pygidium. Jaw formula of proboscis (numbers refer to number of teeth): M II, 4+4 (sometimes 5?); M III, 1+1 (or 2+1); M IV, 1+1. COLOR: In life: Reddish orange, iridescent. In alcohol: Colorless to gray, iridescent; young specimens uniformly reddish brown or somewhat banded with one wide dark brown band per segment.

*Remarks.*—Three small specimens (0.8 mm. wide without setae) have the hooded, hooked setae beginning on the first one to three setigers as in *L. minuta* Théel. They are considered to be the young of *L. fragilis* as has been suggested earlier by Levinsen (1882) and Eliason (1920).

*New records.*—ARCTIC ALASKA: Off Point Barrow base, up to 12.1 miles from shore, 20–123.5 fms., on bottoms of mud, stones, worm tubes and various combinations of mud, sand, gravel, stones, rocks, shells (16 stations, 29 specimens). EAST GREENLAND: Off Cape Hold with Hope, 23–40 fms., Bartlett, 1939. EASTERN NORTH AMERICA: Off Labrador, 5–13 fms., *Blue Dolphin* Expeditions, 1949, 1950; off Nova Scotia, Bay of Fundy, Maine, Massachusetts, Rhode Island, 7–452 fms., U. S. Fish Commission; Woods Hole region, low water and dredged, Pettibone, 1950, 1951. ALASKA: Chiachi Islands, 20 fms., mud, Dall, 1874.

*Distribution.*—Widely distributed in the Arctic: Siberian and Alaskan Arctic, Davis Strait, Greenland, Jan Mayen, Spitsbergen, Franz Josef Land, Barents Sea, Novaya Zemlya, Kara Sea. Also Iceland, Faroes, Norway to Azores, Madeira, Mediterranean; Hudson Bay to Rhode Island; Bering Sea; north Japan Sea. In low water to 1,883 fathoms.

### ? Larval *Lumbrineris fragilis* (O. F. Müller)

On two occasions nonpelagic larval polychaetes were found in a mucous mass off Point Barrow base: September 9, 1948, 21 fathoms, from breaking rock (the larvae described as rose-red); September 6, 1949, 36 fathoms, attached to tunicate *Boltenia echinata*. Prostomium

---

FIGURE 31.—Glyceridae: *a*, *Glycera capitata*, dorsal view prostomium; *b*, same, parapodium from anterior region, posterior view; *c*, same, parapodium from middle region, anterior view; *d*, same, one of jaws. Goniadidae: *e*, *Glycinde wiréni*, dorsal view anterior end; *f*, same, uniramous parapodium from anterior region, anterior view; *g*, same, biramous parapodium from posterior region, anterior view. Lumbrineridae: *h*, *Lumbrineris fragilis*, dorsal view anterior end; *i*, same, maxillary plates of jaw apparatus (one of each pair shown); *j*, same, mandibles of jaw apparatus; *k*, same, parapodium from anterior region, posterior view; *l*, same, parapodium from posterior region, posterior view; *m*, same, limbate seta with capillary tips; *n*, same, simple hooded hooked seta (crotchet). (For explanation of symbols see p. 210.)

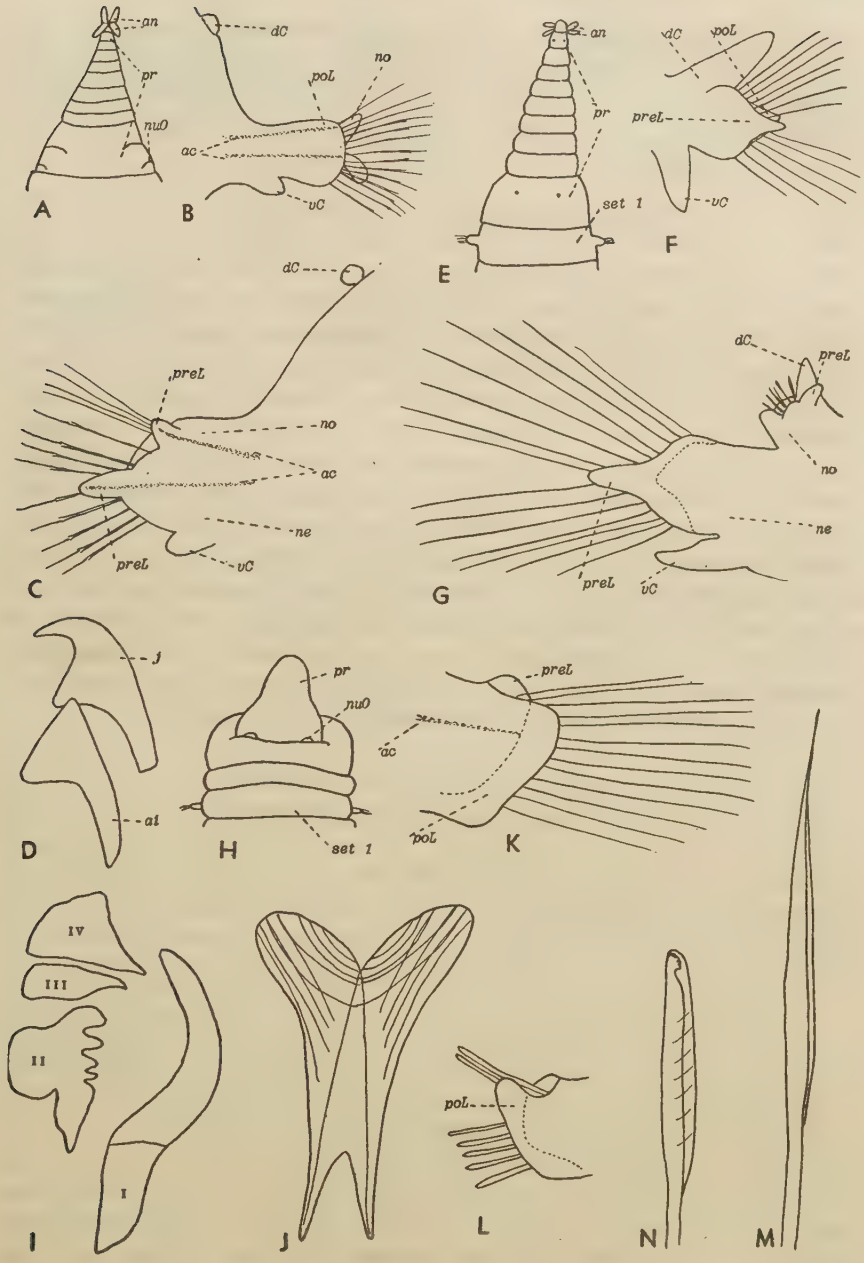


FIGURE 31.—For explanation see facing page.

conical, without appendages. Two wide peristomial segments, the second with wide transverse ciliated band. Setigerous segments 8, gradually tapering posteriorly, each parapodium with single limbate capillary seta and hooded seta. Pygidium bulbous, with wide transverse ciliated band.

## Family Orbiniidae (Ariciidae)

Body long, vermiform, with very numerous segments, divided into two weakly to sharply separable regions: (1) thoracic: More or less flattened dorsoventrally and enlarged; attenuated anteriorly; neuropodia cushionlike, with several rows of setae; notopodia more or less cirriform, a bundle of crenulate capillary setae (fig. 32, *b*); (2) abdominal: Much longer, semicylindrical; neuropodia bilobed, projecting dorsally (fig. 32, *c*). Branchiae medial to notopodia, simple, dorsal, erect, lanceolate or straplike, strongly ciliated, a pair on all segments except the anterior ones. Prostomium conical or globular, without appendages, with or without two small eyes, with two ciliated nuchal organs (fig. 32, *a*). First one or two segments apodous and achaetous. Usually without dorsal or ventral cirri. Setae simple, of varied form. Pygidium with two to four anal cirri. Proboscis eversible, unarmed, a voluminous, weakly- to much-branched, soft sac.

Represented by a single species from Point Barrow.

### Genus *Scoloplos* Blainville, 1828

#### *Scoloplos armiger* (O. F. Müller, 1776)

Figure 32, *a–e*

*Lumbricus armiger* O. F. Müller, 1776, p. 215; 1788, p. 22, pl. 22, figs. 4, 5.
*Aricia arctica* Hansen, 1882, p. 34, pl. 5, figs. 20–26.—Murdoch, 1885, p. 154.
*Scoloplos armiger* Fauvel, 1914, p. 224; 1927, p. 20, fig. 6, *k–q*.—Eliason, 1920, p. 39.—Augener, 1928, p. 742.—Monro, 1930, p. 145.—Annenkova, 1931, p. 203; 1937, p. 169; 1938, p. 170.—Okuda, 1937a, p. 102, fig. 4.—Wesenberg-Lund, 1939b, p. 12; 1950a, p. 29; 1950b, p. 73; 1951, p. 58.—Berkeley and Berkeley, 1942, p. 195; 1952, p. 97, figs. 197–199.—Hartman, 1944a, pp. 336, 340, pl. 18, fig. 5 (not pl. 19, fig. 6 (=*Orbinia*)).—Thorson, 1946, p. 78, fig. 37.—Gorbunov, 1946, p. 39.—Zatsepin, 1948, p. 128, pl. 32, fig. 1.
*Haploscoloplos alaskensis* Hartman, 1948, p. 30, fig. 8, *a–c*.

*Description.*—Length up to 120 mm., width 2 mm. Prostomium conical, pointed, with two deeply buried eyes (not visible when preserved). First segment achaetous and apodous. Branchiae first appear on setigers 12 or 13 (9–17), very small at first, then triangular, then ligulate. Thoracic region consisting of about 17 setigers (12–20); notopodia with conical postsetal lobes and numerous, finely crenulate setae with capillary tips; neuropodia elongate, cushionlike, with a median postsetal conical lobe, with numerous rows of crenulate

setae with capillary tips; some of these setae in the lower part of the neuropodial bundle may be worn down, with blunt tips resembling crotchets. These so-called crotchets may be more or less numerous on all thoracic segments or on some only, or may be lacking. Abdominal region having an exceedingly straggly appearance with the dorsally directed branchiae and parapodial lobes; notopodia with erect, digitiform postsetal lobes and capillary crenulate setae and sometimes also with forked setae; neuropodia with two conical, unequal lips, with capillary crenulate setae and an elongate thickened parapodial flange below the neuropodial lobe. On the last few thoracic and first few abdominal segments there may be one or two extra conical podal lobes, one at the level of the lower part of the neuropodial setae and one subpodal; they are in the transitional region of thoracic and abdominal regions and become part of the parapodial flanges of the abdominal segments. Without intermediate interramal cirri, but with lateral, ciliated organs between the rami. Pygidium with two filiform anal cirri. Proboscis soft, more or less lobed. Color: In alcohol: Without color or yellowish brown, with darker areas on the elongate neuropodial flanges of the abdominal region and on the branchiae.

*Remarks.—Haploscoloplos alaskensis* Hartman from southwestern Alaska is herein referred to *S. armiger*. It differs from the typical *S. armiger* in lacking crotchets in the thoracic neuropodia. As indicated previously by Fauvel (1914) and others, this seems to be a variable character, perhaps associated with the substratum and age. The crotchets were not present on small specimens from Point Barrow, and they may be more numerous in some parapodia than in others and more abundant in the lower part of the neuropodia; they appear to be worn crenulate capillary setae. On certain substrata, presumably, the setae may not be worn and thus the so-called crotchets are absent.

*New records.*—Arctic Alaska: Eluitkak Pass, Elson Lagoon near Point Barrow; west side Elson Lagoon near entrance to small lagoon to the west, 1.2 fms.; off Point Barrow base, up to 12.1 miles from shore, 1.7–75.5 fms., on bottoms of mud, stones, and various combinations of mud, gravel, stones, rocks, large perforated rocks (12 stations, 19 specimens). Between Icy Cape and Cape Lisburne, 15–20 fms., mud, sand, Dall, 1874. East Coast North America: Bay of Fundy, Maine, Massachusetts, 13–48 fms., U. S. Fish Commission.

*Distribution.*—Widely distributed in the Arctic: Siberian and Alaskan Arctic, Davis Strait, Greenland, Jan Mayen, Spitsbergen, Franz Josef Land, White Sea, Novaya Zemlya, Kara Sea. Also Iceland, Faroes, Shetlands to France, Mediterranean; Labrador to

Massachusetts; southern Alaska to British Columbia; Japan; South Pacific (Chile); Antarctic; off South Africa. In low water to 1,100 fathoms.

## Family Spionidae

Body vermiform, without distinct regions. Prostomium small, elongated, scarcely separated from an enlarged peristomium lateral to prostomium, with or without eyes (usually four), antennae usually lacking (may be a small occipital antenna), two very long, extensile, tentaculiform, longitudinally grooved, easily deciduous palps (fig. 32, *f*, *i*, *l*, *r*). Parapodia biramous, with dorsal and ventral postsetal lamellae more or less developed; dorsal and ventral cirri lacking (fig. 32, *g*, *s*). With ligulate or cirriform dorsal branchiae on upper part of parapodial bases on a certain number of segments (rarely pinnate, rarely lacking). Setae simple capillaries and hooded crotchets (fig. 32, *h*, *k*, *q*). Pygidium terminated in an anal cup (fig. 32, *p*) or anal cirri. Proboscis short, scarcely or somewhat protrusible, may be somewhat lobulated.

Represented by four genera and four species from Point Barrow. All genera have branchiae present on certain segments and prostomia without frontal horns.

### Key to the genera of Spionidae from Point Barrow

1. Setigerous segment 5 strongly modified with special large amber-colored setae and without dorsal and ventral lamellae (fig. 32, *m*, *n*). Branchiae numerous, paired, dorsal, simple, straplike. Notopodia with capillary setae only; neuropodia with capillary setae and hooded bidentate crotchets beginning on setigers 7 or 8 (fig. 32, *q*). Pygidium ending in anal cup (fig. 32, *p*)----------**Polydora** (p. 280)

   Setigerous segment 5 not modified---------- 2

2. Branchiae on only few anterior segments, 3–11 pairs, often pinnate (fig. 32, *j*), beginning on setiger 2. Capillary setae and hooded crotchets in both noto- and neuropodia. Pygidium with anal cirri------**Prionospio** (p. 282)

   Branchiae more numerous, simple, straplike. Notopodia with capillary setae only; neuropodia with capillary setae and hooded crotchets---------- 3

3. Branchiae begin on setiger 1, continuing up to last setigers. Pygidium with anal cirri---------- **Spio** (p. 284)

   Branchiae begin on setiger 2, continuing on large number of segments. Pygidium with anal cup, may be somewhat lobulated----- **Nerinides** (p. 285)

### Genus *Polydora* Bosc, 1801

#### *Polydora caulleryi* Mesnil, 1897

Figure 32, *l–q*

*Polydora caulleryi* Mesnil, 1897, p. 88, pl. 3, figs. 12–16.—Fauvel, 1927, p. 54, fig. 19, f–h.

*Polydora brachycephala* Hartman, 1936c, p. 48, figs. 3–5; 1944b, p. 258.

*Description.*—Up to 50 mm. long, 2.2 mm. wide. Prostomium feebly notched anteriorly or distinctly bifid, prolonged posteriorly in a crest extending to setiger 4 (to 6), without distinct occipital antenna, with four eyes in trapezoidal arrangement (or six in young specimens) or eyes lacking. Palps usually missing in alcohol. A protrusible, somewhat lobulated, brownish proboscidial region. Branchiae begin on setigers 7 or 8, continuing on numerous segments, absent from more posterior segments; branchiae short (about length of capillary notosetae), straplike, continuous with dorsal lamellae. Modified setiger 5 with group of capillary notosetae, usually 5–7 (3–12) special amber-colored hooks, and group of capillary neurosetae; special hooks all similar, falcate, with pectinate top. With conspicuous, somewhat conical dorsal and ventral postsetal lamellae on setigers 1–4, lacking on modified setiger 5, becoming rather low and wide on more posterior segments. With capillary setae in both notopodia and neuropodia; beginning on setiger 7, neuropodial capillary setae mostly replaced by hooded bidentate crotchets. In more posterior setigers (last 20 or so), notopodia conical, lacking branchiae or lamellae, with conical bundle of awl-shaped setae scarcely surpassing notopodial tip and small bundle of capillary setae; neuropodia with two or three crotchets and few capillary setae. Anal disc with complete middorsal notch, shorter midventral and midlateral notches, thus 4-lobed. Color: In alcohol: Without color or grayish.

*Remarks.*—The type of *P. brachycephala* Hartman from central California was examined and is herein referred to *P. caulleryi.*

*New records.*—Arctic Alaska: Off Point Barrow base, up to 8 miles from shore, 16.7–75.5 fms., on bottoms of stones and various combinations of mud, gravel, stones, rocks, large perforated rocks, with bryozoans and hydroids (8 stations, 16 specimens). West Coast North America: Washington and Puget Sounds, low water to 50 fms., Pettibone.

*Distribution.*—Arctic Alaska to central California; Ireland, Great Britain to France. In low water to 75.5 fathoms.

### *Polydora* larva

A larva of a *Polydora* was taken in plankton August 2, 1948. This was perhaps the larva of *P. caulleryi* Mesnil since it was the only species of *Polydora* found in the Point Barrow region. Prostomium rounded, with two palps, and with black chromatophores. Fifth setigerous segment modified, with short, thick, slightly curved acicular setae; rest of 21 setigerous segments with long larval capillary setae. Pygidium a rounded disc, notched middorsally, with black chromatophores. Black chromatophores arranged transversely on setigers 2–5, then in two longitudinal lines on each side of middorsal line, extending to anal cup.

## Genus *Prionospio* Malmgren, 1867

### *Prionospio malmgreni* Claparède, 1868

FIGURE 32, *i–k*

*Prionospio malmgreni* Claparède, 1868, p. 333, pl. 22, fig. 3 (fide Fauvel, 1927).—Ehlers, 1913, p. 511.—Fauvel, 1927, p. 61, fig. 21, a–e.—Annenkova, 1937, p. 171; 1938, p. 174.—Hartman, 1948, p. 36.—Wesenberg-Lund, 1951, p. 70.—Berkeley and Berkeley, 1952, p. 29, figs. 54, 55.

*Spiophanes tenuis* Verrill, 1879b, p. 176.

*Prionospio tenuis* Verrill, 1882, p. 370.—Hartman, 1944a, pp. 336, 340, ? pl. 19, fig. 7; not 1945, p. 32 (=*P. treadwelli* Hartman, 1951).

*Description.*—Length up to 25 mm., width 1 mm. Prostomium dilated anteriorly, with anterior border rounded, narrowing posteriorly, extending in obtuse crest to setiger 2 (to 4). Four eyes, two smaller, two much larger (may be lacking). Two long palps, usually missing (in alcohol). A short, eversible, somewhat lobulated proboscidial region. Branchiae four pairs, on setigers 2–5, completely separated from dorsal lamellae, pairs 1 and 4 longer, pinnate, somewhat deciduous, pairs 2 and 3 shorter, smooth, triangular. Dorsal postsetal lamellae of first setiger small, much larger and triangular on next four setigers, then diminishing in size, becoming reduced beginning on setigers 8 or 9; ventral postsetal lamellae oval, rounded. Hooded, multidentate crotchets beginning about setigers 12–16 in neuropodia and about setiger 40 in notopodia. Beginning on setiger 7, slightly elevated transverse folds between dorsal lamellae, continuing on next 6–14 segments. Pygidium with longer, unpaired dorsal cirrus and two smaller lateral ones. Without color in alcohol.

*Remarks.*—The types of *Prionospio tenuis* Verrill from Cape Cod Bay were examined and are herein referred to *P. malmgreni*. There are four pairs of branchiae, the first and fourth pairs pinnate, the second and third pairs shorter, smooth.

*New records.*—ARCTIC ALASKA: Off Point Barrow base, 4 miles from shore, 29 fms., on bottom of gravel, small stones (1 station, 2 speci-

---

FIGURE 32.—Orbiniidae: *a*, *Scoloplos armiger*, dorsal view anterior end; *b*, same, parapodium from thoracic region, posterior view; *c*, same, parapodium from abdominal region, anterior view; *d*, *e*, same, crenulate neurosetae from thoracic region. Spionidae: *f*, *Spio filicornis*, dorsal view anterior end (palps missing); *g*, same, parapodium from anterior region, anterior view; *h*, same, hooded bidentate crotchet; *i*, *Prionospio malmgreni*, dorsal view anterior end; *j*, same, branchiae on setigers 2–5 (one of each pair shown); *k*, same, hooded multidentate crotchet; *l*, *Polydora caulleryi*, dorsal view anterior end (palps missing); *m*, same, parapodium of modified fifth setigerous segment; *n*, same, special hooks from setiger 5; *o*, same, notopodium of posterior setiger, with conical bundle awl-shaped setae; *p*, same, anal disc of pygidium, lateral view; *q*, same, hooded bidentate crotchet, *r*, *Nerinides* sp., dorsal view anterior end; *s*, same, parapodium from anterior region. (For explanation of symbols, see p. 210.)

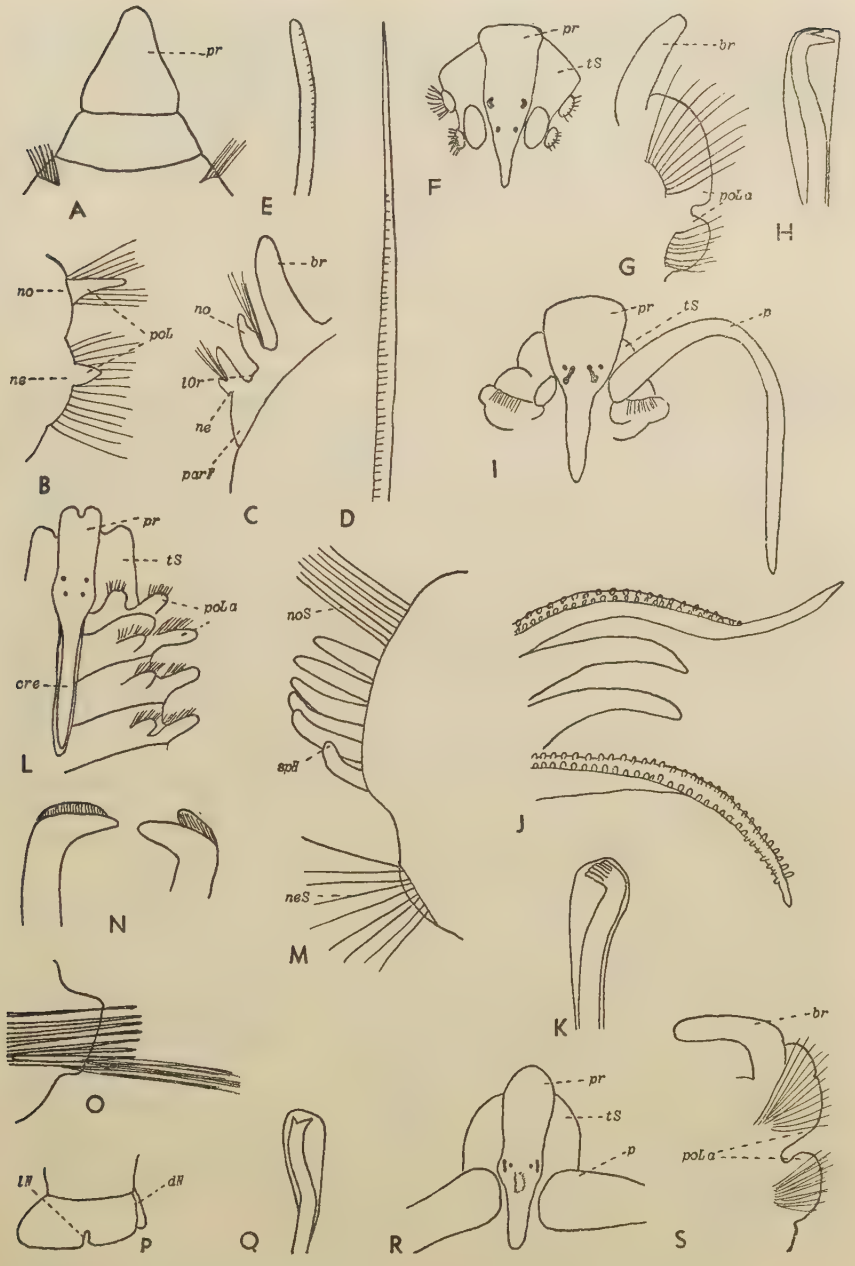


FIGURE 32.—For explanation see facing page.

261112—54——6

mens). West Coast North America: Puget Sound, Washington, low water, mud, Pettibone. East Coast North America: Off Labrador, 40 fms., *Blue Dolphin* Expedition, 1949; off New Hampshire and Massachusetts, 25–48 fms., U. S. Fish Commission.

*Distribution.*—Arctic Alaska to Washington; north Japan Sea; Iceland, Norway to Mediterranean; Labrador to Massachusetts; South Africa. In low water to 250 fathoms; surface.

### Genus *Spio* Fabricius, 1785

#### *Spio filicornis* (Müller, 1776)

Figure 32, *f–h*

*Nereis filicornis* Müller, 1776, p. 218.

*Spio filicornis* Malmgren, 1867, p. 91, pl. 1, fig. 1.—Eliason, 1920, p. 40, figs. 7–9.—Fauvel, 1927, p. 43, fig. 15, a–g.—Augener, 1928, p. 738, pl. 11, fig. 7.—Annenkova, 1937, p. 169; 1938, p. 173.—Hartman, 1941a, p. 293; 1948, p. 36.—Berkeley and Berkeley, 1943, p. 130.—Thorson, 1946, p. 93, fig. 46.—Zatsepin, 1948, p. 132, pl. 32, fig. 11.—Wesenberg-Lund, 1950a, p. 30; 1950b, p. 76; 1951, p. 71.

*Spio limicola* Verrill, 1879, p. 176.

*Spio filicornis* var. *pacifica* Berkeley and Berkeley, 1936, p. 475; 1952, p. 25, figs. 47, 48.

*Description.*—Up to 30 mm. long, 2 mm. wide. Prostomium bell-shaped to conical, widest anteriorly, rounded, tapered posteriorly to short crest extending on first two setigers. Four eyes in trapezoidal arrangement, anterior pair larger. Two palps missing (in alcohol). A short, eversible, somewhat lobulated proboscidial region. Branchiae begin on setiger 1, continuing to posterior end, simple, straplike. Dorsal postsetal lamellae of more anterior segments short, wide, with branchiae fused to upper sides; in more posterior segments, lamellae cirriform, separate from branchiae. Ventral postsetal lamellae rounded, not notched. Capillary setae only in notopodia. Neuropodia with hooded, bidentate crotchets beginning on setigers 9–18, about six in number (5–10). Pygidium with four cirri? Color: In alcohol: Yellowish white with dark brown pigment on peristomial region and along each side of anterior fourth of body.

*Remarks.*—The types of *Spio limicola* Verrill from Cape Cod Bay were examined and are herein referred to *S. filicornis*. *S. limicola* differs from *S. setosa* Verrill, to which it has been referred (Hartman, 1942, p. 63), in the number of neuropodial hooded crotchets, 6–9 in *S. limicola* and about 16 in *S. setosa*.

*New records.*—Arctic Alaska: Off Point Barrow base, up to 8 miles from shore, 36–75.5 fms., on various combinations of gravel, rocks, stones, large perforated rocks (2 stations, 2 specimens). West Coast North America: Washington Sound, low water, Pettibone. East Coast North America: Off Massachusetts, 15–31 fms., U. S. Fish Commission.

*Distribution.*—Widely distributed in the Arctic: Siberian and Alaskan Arctic, Davis Strait, Greenland, Spitsbergen, Novaya Zemlya. Also Iceland, Faroes, Norway to France; Hudson Bay to Massachusetts; Bering Sea to central California; Japan. In low water to 211 fathoms; surface.

### Genus *Nerinides* Mesnil, 1896

#### *Nerinides* sp.

FIGURE 32, *r*, *s*

Two small specimens obtained from plankton 10 feet from shore, agreeing in some respects with the description of *N. cantabra* Rioja (Fauvel, 1927, p. 31). Length 16 mm., width 1 mm., segments 57. Prostomium rounded anteriorly, tapering posteriorly, with middorsal crest extending on first setiger, with four eyes, one pair larger, a raised area just posterior to eyes (median antenna?), with two large, thick palps (fig. 32, *r*). Dorsal and ventral postsetal lamellae distinct, dorsal ones may be slightly undulate, ventral ones entire, not notched (fig. 32, *s*). Branchiae begin on setiger 2, continuing to near posterior end, fused to upper part of dorsal lamellae. Body with low transverse dorsal ridges between bases of branchiae. First setiger with both dorsal and ventral setae. Notopodia with only capillary setae, being extra long in posterior region. Neuropodia with capillary setae and hooded bidentate crotchets beginning around setiger 20. Pygidium with 4-lobed membranous appendage. Without color in alcohol.

## Family CIRRATULIDAE

Body more or less cylindrical, attenuated at both ends, with numerous, short, compact, nearly similar segments. Prostomium small, usually without appendages, with or without eyes. Pair of large grooved spioniform palps (fig. 33, *d*) or with more or less numerous grooved tentacular filaments inserted on dorsal surface of an anterior segment (fig. 33, *a*). Branchiae simple, filamentous, long, contractile, inserted above notopodia on few to many segments (may be absent). Parapodia biramous, lobes scarcely projecting (fig. 33, *b*). Setae usually simple, some capillary, others acicular crotchets (fig. 33, *c*). Without dorsal, ventral, or anal cirri. Proboscis smooth, unarmed. May have epitokous pelagic form at time of reproduction. Usually in mud; some (*Dodecaceria*) in calcareous matrix.

Represented by two genera and two species from Point Barrow. Both genera have prostomium conical, buccal segment and two following segments achaetous, more or less fused to prostomium, with lateral filamentous branchiae beginning just anterior to first setigerous segment, continuing on large number of segments.

## Key to the genera of Cirratulidae from Point Barrow

1. With few to numerous, grooved tentacular filaments just anterior to first setigerous segment, subequal to branchiae (without 2 palps; fig. 33, *a*). **Cirratulus** (p. 286)

With 2 large grooved, spioniform palps just anterior to first setigerous segment (without tentacular filaments; palps deciduous; may be missing in epitoke; fig. 33, *d*)---------- **Chaetozone** (p. 287)

## Genus *Cirratulus* Lamark, 1801

### *Cirratulus cirratus* (Müller, 1776)

FIGURE 33, *a–c*

*Lumbricus cirratus* Müller, 1776, p. 215.

*Cirratulus cirratus* Malmgren, 1867, p. 95.—Chamberlin, 1920, p. 20.—Eliason, 1920, p. 57.—Fauvel, 1927, p. 94, fig. 33, a–g; 1933, p. 46; 1936, p. 72.—Augener, 1928, p. 750, pl. 11, fig. 9.—Monro, 1930, p. 154; 1936, p. 161.—Annenkova, 1931, p. 203; 1932, p. 136; 1934, p. 322; 1937, p. 173; 1938, p. 181.—Berkeley and Berkeley, 1942, p. 197; 1943, p. 130; 1952, p. 31, figs. 58, 59.—Hartman, 1944a, pp. 334, 341; 1944b, p. 263; 1948, p. 37.—Gorbunov, 1946, p. 39.—Zatsepin, 1948, p. 133, pl. 32, fig. 18.—Wesenberg-Lund, 1950a, p. 33; 1950b, p. 81; 1951, p. 74.—Hartman and Reish, 1950, p. 34.

*Cirratulus robustus* Johnson, 1901, p. 423, pl. 14, figs. 149, 150.—Rioja, 1941, p. 728.—Berkeley and Berkeley, 1942, p. 197.

*Cirratulus cingulatus* Johnson, 1901, p. 422, pl. 14, figs. 145–148.—Rioja, 1941, p. 729.

*Cirratulus spectabilis* Berkeley and Berkeley, 1952, p. 32.

*Description.*—Length up to 300 mm., width 5 mm. Prostomium variable in shape: Short, broad, bluntly conical; almost square-shaped; or tapered gradually, then abruptly. Prostomium with usually four or five (2–8) eyes on each side in obliquely transverse row or may be united in almost solid arc. Buccal segment more or less fused with prostomium, two following achaetous segments more or less distinct. Tentacular filaments anterior to first setigerous segment, in two groups of 2–24 in obliquely transverse rows, long, filamentous, grooved longitudinally. Branchiae begin just anterior to first setigerous segment, lateral to group of tentacular filaments, continuing through greater part of body, anteriorly inserted close to upper part of notopodia, then gradually shifting more dorsally and then slightly more ventrally. Parapodia consisting of slightly projecting tori common to both noto- and neuropodia, with capillary setae in both lobes, with additional acicular crotchets first appearing in neuropodia and more posteriorly in notopodia also. Anus subdorsal. COLOR: In life: Orange yellow with red branchiae; dark orange brown with orange-red branchiae. In alcohol: Yellowish brown or without color.

*New records.*—ARCTIC ALASKA: Eluitkak Pass, Elson Lagoon near Point Barrow, 5–6.6 fms.; off Point Barrow base, up to 8 miles from

shore, 13.3–75.5 fms., on bottoms of stones, and various combinations of mud, pebbles, rock, stones, gravel, large perforated rocks, with bryozoans, embedded in mud at bases of barnacles and bryozoans as *Eucratea loricata* (19 stations, 183 specimens). SIBERIA: Plover Bay, 10–35 fms., Dall, 1880. BERING SEA: *Albatross* station, Nikolski, Bering Island, 1892; St. George Island, Pribilofs, 2 miles off shore, 40 fms., Hanna, 1913; Atka Island, Aleutians, L. M. Turner, 1879. WEST COAST NORTH AMERICA: Strait of Juan de Fuca, Washington and Puget Sounds, low water, Pettibone. EAST COAST NORTH AMERICA: Off Labrador, 95 fms., *Blue Dolphin* Expedition, 1949; off Maine, Massachusetts, low water to 67 fms., U. S. Fish Commission.

*Distribution.*—Widely distributed in the Arctic: Siberian, Alaskan, and Canadian Arctic, Greenland, Spitsbergen, Barents Sea, Novaya Zemlya. Also Iceland, Faroes, Norway to France, Canary Islands; Hudson Bay to Massachusetts; Bering Sea to México; north Japan Sea to Japan, Manchuria. Southern latitudes: Falkland Islands, Magellan Straits, South Georgia, Kerguelen. In low water to 1,611 fathoms.

## Genus *Chaetozone* Malmgren, 1867

### *Chaetozone setosa* Malmgren, 1867

FIGURE 33, *d*

*Chaetozone setosa* Malmgren, 1867, p. 96, pl. 14, fig. 84.—Théel, 1879, p. 54, pl. 4, figs. 49–51.—Fauvel, 1914, p. 217, pl. 20, fig. 1; 1927, p. 101, fig. 35; 1934a, p. 47.—Eliason, 1920, p. 57.—Augener, 1928, p. 750.—Gustafson, 1936, p. 8.—Monro, 1937, p. 301.—Annenkova, 1937, p. 174; 1938, p. 182.—Berkeley and Berkeley, 1942, p. 197; 1952, p. 35, fig. 63.—Hartman, 1944a, pp. 334, 341.—Zatsepin, 1948, p. 133, pl. 32, fig. 16.—Wesenberg-Lund, 1950a, p. 34; 1950b, p. 81; 1951, p. 75.

*Description.*—Length up to 25 mm., width 2 mm. Prostomium conical, acutely pointed, without eyes. Buccal segment and two following achaetous segments more or less fused; in specimens from Point Barrow, buccal segment fused with prostomium, second and third segments fused dorsally. Paired palps large, long, grooved, inserted just anterior to first setigerous segment, deciduous, often missing on preserved specimens and missing when in epitokous phase. Branchial filaments begin just anterior to first setigerous segment, immediately posterior to palps, continuing on large number of anterior segments, lacking on posterior region, readily deciduous, inserted just posterior to upper part of parapodial tori. Parapodia are slightly projecting tori common to both noto- and neuropodia. In anterior region, both lobes with long, delicate capillary setae; more posteriorly, notopodia with still longer capillary setae, neuropodia with shorter, stouter capillary setae and short, unidentate acicular crotchets; more posteriorly, with acicular crotchets in both noto- and neuropodia.

In epitokous phase, dorsal setae in anterior region much longer; in posterior region, parapodial tori more projecting, dorsal and ventral acicular crotchets forming semicircular, fan-shaped group, almost encircling body. Pygidium with small, rounded to conical lobe, ventral and posterior to anus (like a cover for anal opening). COLOR: In alcohol: Light to dark gray, brownish, or iridescent bluish black.

*New records.*—ARCTIC ALASKA: Off Point Barrow base, up to 12.1 miles from shore, 20–123.5 fms., on various combinations of mud, stones, gravel, rocks, large perforated rocks, mass of worm tubes, on surface of tunicates (12 stations, 29 specimens). EAST COAST NORTH AMERICA: Off Labrador, 95–125 fms., *Blue Dolphin* Expedition, 1949; off Maine, New Hampshire, Massachusetts, 11–58 fms., U. S. Fish Commission.

*Distribution.*—Widely distributed in the Arctic: Siberian and Alaskan Arctic, Davis Strait, Greenland, Spitsbergen, Franz Josef Land, Barents Sea, Novaya Zemlya. Also Iceland, Faroes, Norway to Canary Islands, Mediterranean, Adriatic, Gulf of Aden; Labrador to Massachusetts; Bering Sea to British Columbia; north Japan Sea. Southern latitudes: Falkland Islands, Magellan Straits, Kerguelen. In low water to 1,333 fathoms; surface.

## Family FLABELLIGERIDAE (CHLORAEMIDAE)

Body subcylindrical or subfusiform, with short similar segments covered with papillae, often with adherent sand grains, may be encased in thick mucous mantle. Prostomium and buccal segment fused, with two thick grooved palps, two groups of filiform cephalic branchiae, and more or less developed buccal tube around mouth, all of which may be partially or completely retracted within anterior setigers, with or without setae of anterior setigers directed anteriorly forming a cephalic cage. Parapodia biramous; notosetae simple, capillary, ringed; neurosetae simple or pseudocompound, capillary or hooked. Without dorsal, ventral, or anal cirri. Anus terminal. Usually in muddy sand.

Represented by two genera and three species from Point Barrow.

### Key to the genera of Flabelligeridae from Point Barrow

1. Body covered with long pedunculate papillae (fig. 33, *g*), usually encased in thick mucous mantle. Fused prostomium and buccal segment partially retractile within first setigers and more or less hidden by cephalic cage formed by setae of first setiger, the setae long, directed anteriorly, almost completely encircling segment ..... **Flabelligera** (p. 289)

   Body covered with short papillae, usually encrusted with sand, not encased in mucous mantle. Fused prostomium and buccal segment completely retractile within anterior setigers, may be completely hidden; without cephalic cage formed by anterior setigers; when buccal segment, etc. are retracted, anterior end is trilobed (fig. 33, *h*) ..... **Brada** (p. 290)

## Genus *Flabelligera* Sars, 1829

### *Flabelligera affinis* Sars, 1829

FIGURE 33, *e–g*

*Flabelligera affinis* Sars, 1829, p. 31, pl. 3, fig. 16 (fide Malmgren, 1867).—Malmgren, 1867, p. 83.—Chamberlin, 1920, p. 21.—Eliason, 1920, p. 62.—Fauvel, 1927, p. 113, fig. 40, a–f.—Augener, 1928, p. 768.—Monro, 1930, p. 160, fig. 63; 1936, p. 164.—Annenkova, 1937, p. 174; 1938, p. 184.—Berkeley and Berkeley, 1943, p. 130.—Hartman, 1944a, pp. 335, 341, pl. 33, figs. 12, 13 (as ?*Brada setosa* Verrill).—Gorbunov, 1946, p. 39.—Zatsepin, 1948, p. 134, pl. 33, fig. 1.—Støp-Bowitz, 1948a, p. 8, fig. 1; 1948b, p. 30.—Wesenberg-Lund, 1950a, p. 35; 1950b, p. 82; 1951, p. 76.

*Flabelligera infundibularis* Johnson, 1901, p. 417, pl. 12, figs. 124–127.—Hartman, 1938c, p. 14; 1948, p. 40.—Berkeley and Berkeley, 1952, p. 7, figs. 1–4.

*Flabelligera infundibularum* Moore, 1923, p. 223.

*Flabelligera infundibuliformis* Hartman and Reish, 1950, p. 35.

*Description.*—Length up to 130 mm., width including mantle 12–15 mm., segments up to 71. Body rounded, attenuated slightly anteriorly and more so posteriorly. Body covered with numerous papillae which are elongate, thin, flexible, usually somewhat coiled, with larger bulbous tips quite variable in shape. Body usually covered with thick, mucous, transparent mantle (may be missing in small specimens or specimens appearing in surface waters) which is penetrated by the pedunculate papillae. Fused prostomium and buccal segment retractile within anterior setiger, with pair of stout, grooved palps, two groups of numerous filiform branchiae, two pairs of eyes (almost coalesced), and somewhat protruding buccal siphon around ventral mouth opening. First setigerous segment with wide, funnellike depression into which buccal siphon, etc., can mostly be withdrawn; with circlet of elongated, ringed setae around margin and directed forward or spread funnellike, forming cephalic cage; with numerous elongate papillae having slender straight peduncles and fusiform tips. Notopodia conical, diagonally truncate lobes, with capillary ringed setae, with elongate papillae on posterior side that may be up to three-fourths length of notosetae (similar in shape to those around cephalic cage; different from those on body). Neuropodia conical, each with usually one (sometimes two) large, hooked, amber-colored pseudocompound seta, ringed basally, hooked tips dark to black. When mucous mantle is present, setae almost completely embedded and the hooked tips of neurosetae and capillary tips of notosetae only extending beyond mantle. Pygidium a fleshy, rounded rim; anus subdorsal. COLOR: In alcohol: Without color or slightly reddish brown.

*New records.*—ARCTIC ALASKA: West side Elson Lagoon near entrance to small lagoon to west, 1.2 fms.; Point Barrow base, washed ashore; off Point Barrow base, 18.3–123.5 fms., on various combina-

tions of mud, stones, gravel, rocks, with mass of worm tubes (12 stations, 15 specimens). BERING SEA: *Albatross* Sta. 3274, 55°34′ N., 162°31′ W., 19 fms., and station at Unalaska, Aleutians, 1890; Iluiliuk Harbor, Unalaska, Dall, 1871. WEST COAST NORTH AMERICA: Washington and Puget Sounds, 10 fms. and surface, Pettibone. CANADIAN ARCTIC: Dobbin Bay, east Ellesmere Land, 79°36′ N., 73°35′ W., 16 fms., W. H. Littlewood, 1950. Foxe Basin, Baffin Island, 66°83′ N., 80°07′ W., Bartlett, 1927. WEST GREENLAND: Between Capes Alexander and Chalon, 25–40 fms., Bartlett, 1937. EAST COAST NORTH AMERICA: Off Labrador, 10–30 fms., *Blue Dolphin* Expeditions, 1949, 1950; Grand Manan, Maine, New Hampshire, Massachusetts, 3–90 fms., U. S. Fish Commission.

*Distribution.*—Widely distributed in the Arctic: Siberian, Alaskan, and Canadian Arctic, Greenland, Spitsbergen, Franz Josef Land, Barents Sea, White Sea, Novaya Zemlya, Kara Sea. Also Iceland, Faroes, Norway to France, Mediterranean; Hudson Bay to Massachusetts; Bering Sea to southern California; north Japan Sea. Southern latitudes: Falkland Islands, Magellan Straits, South Georgia, South Africa, Australia. In low water to 889 fathoms; surface.

## Genus *Brada* Stimpson, 1854

### Key to the species of Brada from Point Barrow

1. Body covered with filiform papillae, often encrusted with sand grains, with tips of papillae bare. Notopodia distinct, with 2–5 capillary setae per lobe.
**B. villosa**

Body covered with low globular papillae, often encrusted with a thin layer of sand grains. Notopodia indistinct, with 0–2 very delicate capillary setae.
**B. inhabilis**

### *Brada villosa* (Rathke, 1843)

*Siphonostoma villosum* Rathke, 1843, p. 215, pl. 11, figs. 11, 12.
*Brada villosa* Malmgren, 1867, p. 84.—Eliason, 1920, p. 62.—Chamberlin, 1920, p. 22.—Fauvel, 1927, p. 121, fig. 43, e–l; 1934a, p. 49.—Monro, 1930, p. 161; 1937, p. 303.—Annenkova, 1937, p. 175; 1938, p. 185.—Okuda, 1937b, p. 53, pl. 2, fig. D.—Berkeley and Berkeley, 1943, p. 130; 1952, p. 7, fig. 5.—Zatsepin, 1948, p. 136, pl. 33, fig. 4.—Støp-Bowitz, 1948a, p. 33, fig. 9; 1948b, p. 39, fig. 15.—Hartman and Reish, 1950, p. 35.—Wesenberg-Lund, 1950a, p. 35; 1950b, p. 85; 1951, p. 78, fig. 7.
*Brada setosa* Verrill, 1873, pp. 431, 434, 508, 606; 1881, p. 302, pl. 9, fig. 4.—Sumner, Osburn and Cole, 1913, p. 630.
*Trophonia rugosa* Hansen, 1882, p. 38, pl. 7, figs. 9–12.
*Trophonia arctica* Hansen, 1882, p. 39, pl. 7, figs. 17–20.
*Brada granulata* Murdoch, 1885, p. 155 (not *B. granulata* Malmgren, 1867).
*Brada pilosa* Moore, 1906b, p. 231, pl. 10, figs. 14–17.
*Stylaroides pluribranchiata* Moore, 1923, p. 222.
*Brada rugosa* Støp-Bowitz, 1948a, p. 37, fig. 10; 1948b, p. 41.

*Description.*—Length 28–60 mm., width 5–9 mm., setigers 23–35. Body fusiform, slightly flattened ventrally, convex dorsally, attenuated and more or less elongated posteriorly, having a characteristic rough, hirsute aspect, covered with cylindrical, fusiform to claviform papillae, longer dorsally than ventrally, usually encrusted with sand grains more basally, with distal tips bare; there are all gradations: Without encrusting sand (looks "hairy"), with scattered sand grains, and with rather thick layer of sand grains, usually fewer on anteroventral part. Underlying surface nodular and, in larger specimens, outer papillate layer may be worn off, the surface appearing rugose, with low mounds. Retractile prostomium and buccal region with two groups of numerous filiform branchiae borne on pair of dorsolateral bosses, pair of thick grooved palps, and ventral eversible buccal siphon around mouth. Setae of first setigerous segment 8–10 per bundle, slightly more elongate than following, directed anteriorly. Notopodia and neuropodia distinct, with long fusiform papillae grouped around setae. Notosetae long, capillary, ringed, 2–5 in number. Neurosetae beginning on setiger 2, large, 3–6 in number, amber-colored, ending in sharp, transparent, and fragile tips. Pair of nephridial papillae near anterior border of ventral side of setiger 5. Color: In life and in alcohol: Brownish, dull sandy-mud.

*Remarks.*—The types of *Brada setosa* Verrill from Massachusetts, *B. pilosa* Moore from Alaska, and *Stylaroides pluribranchiata* Moore from California were examined and are herein referred to *B. villosa*. The excessive "hairiness" of *B. pilosa* appears to be a variable character; there may be varying numbers of papillae as well as all gradations in the amount of encrusting sand grains. Two large specimens washed ashore at Point Barrow were at first identified as *B. rugosa*, following Støp-Bowitz (1948); they agree in the large size (23–24 setigers, 28–30 mm. long, 5–7 mm. wide), the almost complete absence of papillation, and the thick rugose surface; the outer surface, however, appears to be worn off. There are some remains of the papillated surface on the parapodial lobes. Thus *B. rugosa* (including *T. arctica*) is herein referred to *B. villosa*, where it has been referred earlier by Fauvel and others.

*New records.*—Arctic Alaska: Point Barrow base, washed ashore September 22, 1949 (22 specimens), August 10, 1950 (2 specimens); off Point Barrow base, up to 4 miles from shore, 27–29 fms., on various combinations of mud, gravel, stones, rocks (2 stations, 2 specimens). Bering Sea: 62°15′ N., 167°48′ W., Stoney, 1884; *Albatross* Sta. 3337, 53°55′ N., 163°26′ W., 280 fms., 1890. West Coast North America: Washington Sound, Pettibone; *Albatross* Sta., northwest West Point, Elliot Bay, Seattle, 1914. East Coast North America: Off Nova

Scotia, Maine, Massachusetts, Rhode Island, 6–499 fms., U. S. Fish Commission.

*Distribution.*—Widely distributed in the Arctic: Siberian, Alaskan, and Canadian Arctic, Greenland, Spitsbergen, Barents Sea, Novaya Zemlya, Kara Sea. Also Iceland, Faroes, Norway to Spain, Mediterranean, Adriatic, south Arabian Coast; Hudson Bay to Rhode Island; Bering Sea to southern California; north Japan Sea to Japan; South Atlantic: South Orkney and South Shetland Islands. In low water to 853 fathoms.

### *Brada inhabilis* (Rathke, 1843)

FIGURE 33, *h*

*Siphonostoma inhabile* Rathke, 1843, p. 218, pl. 11, fig. 13.

*Brada sublaevis* Stimpson, 1854, p. 32.—Verrill, 1881, pp. 289, 304.—Webster and Benedict, 1887, p. 731.

*Brada granulata* Malmgren, 1867, p. 85, pl. 12, fig. 71.—Théel, 1879, p. 52.—not Murdoch, 1885, p. 155 (=*B. villosa*).—Annenkova, 1937, p. 176; 1938, p. 186.—Hartman, 1944a, pp. 334, 341; 1948, p. 41.—Zatsepin, 1948, p. 135, pl. 33, fig. 3.—Wesenberg-Lund, 1950a, p. 36; 1950b, p. 85.

*Brada granosa* Treadwell, 1937, p. 32 (not *B. granosa* Stimpson, 1854).

*Brada inhabilis* Støp-Bowitz, 1948a, p. 40, fig. 11; 1948b, p. 42, fig. 16.—Wesenberg-Lund, 1951, p. 80.

*Description.*—Length 30–60 mm., width 8–12 mm., segments 23–26. Body subfusiform, grub-shaped, flattened ventrally, strongly arched dorsally, usually curved ventrally (in alcohol). Body surface covered with low globular papillae (to naked eye surface appears almost smooth, granular), usually with thin layer of sand grains, often with an almost uniform layer of larger sand grains on dorsum. Prostomium and buccal segment with two groups of three to four filiform branchiae, pair of grooved palps, and buccal siphon around mouth. First segment achaetous (may be few very, delicate capillary setae), second segment with two small neurosetae, rest of segments with neuropodia as slightly elevated lobes and about four (2–9) amber-colored neurosetae with curved tips. Without distinct notopodia; notosetae poorly developed, one or two or absent, extremely capillary, easily overlooked. Nephridial papillae on ventral side between segments 4 and 5 (setigers 3 and 4, since the first segment is usually achaetous). COLOR: In life: Orange yellow. In alcohol: Light gray to ashy.

*Remarks.*—*B. granulata* Malmgren is herein referred to *B. inhabilis*, following Støp-Bowitz (1948a). *B. sublaevis* Stimpson should also be referred here and not to *B. rugosa* (Hansen) as indicated by Støp-Bowitz (1948a, p. 37).

*New records.*—ARCTIC ALASKA: Off Point Barrow base, up to 12.1 miles from shore, 20–123.5 fms., on bottoms of rocks, stones, gravel, and mass of worm tubes (5 stations, 9 specimens). NORTHWEST

Greenland: 1 mile northwest Conical Rock, 25–60 fms., Bartlett, 1938. Bering Sea: *Albatross* Sta. 3223, 54°26′ N., 165°32′ W., 56 fms., 1890; Bering Strait, 13 fms., Dall, 1880. Alaska: Iliuliuk Harbor, Unalaska, 1871, and New Harbor, Unga Island, under stones, 1872, Dall; Kodiak, W. J. Fisher. East Coast North America: Off Labrador, 95 fms., *Blue Dolphin* Expedition, 1949; Bay of Fundy, Maine, 48–90 fms., U. S. Fish Commission.

*Distribution.*—Widely distributed in the Arctic: Siberian, Alaskan, and Canadian Arctic, Davis Strait, Greenland, Novaya Zemlya,Kara Sea. Also Iceland, Faroes, Norway to Danish waters; Labrador to Maine; Bering Sea to Gulf of Alaska; north Japan Sea. In low water to 609 fathoms.

## Family Scalibregmidae

Body inflated anteriorly or short, fusiform. Integument roughened or tesselated and divided into superficial rings. Prostomium small, bilobed, or entire and with frontal horns; two ciliated evaginable nuchal grooves on each side of prostomium (fig. 33, *i*). Buccal segment achaetous. Parapodia biramous, rami small, with or without dorsal and ventral cirri. Setae simple, capillary, some single, some forked. Branchiae limited to anterior few segments (may be absent). Pygidium with or without anal cirri. Proboscis eversible, unarmed, globular, smooth.

Represented by a single species from Point Barrow.

### Genus *Scalibregma* Rathke, 1843

#### *Scalibregma inflatum* Rathke, 1843

Figure 33, *i–k*

*Scalibregma inflatum* Rathke, 1843, p. 184, pl. 9, figs. 15–21.—Moore, 1923, p. 217.—Fauvel, 1927, p. 123, fig. 44, a–f; 1932, p. 187; 1934a, p. 50.—Augener, 1928, p. 754.—Monro, 1930, p. 163.—Annenkova, 1934, p. 322; 1937, p. 176; 1938, p. 186.—Okuda, 1938b, p. 99.—Hartman, 1944a, pp. 336, 341; 1948, p. 40.—Støp-Bowitz, 1946, p. 67, fig. 2; 1948b, p. 24, fig. 8.—Zatsepin, 1948, p. 136, pl. 33, fig. 10.—Wesenberg-Lund, 1950a, p. 36; 1950b, p. 86; 1951, p. 81.—Berkeley and Berkeley, 1952, p. 58, figs. 119–121.
*Scalibregma brevicauda* Verrill, 1873, pp. 416, 422, 605; 1881, p. 302, pl. 9, fig. 5.
*Scalibregma minutum* Webster and Benedict, 1887, p. 727.

*Description.*—Length up to 100 mm., width 13 mm., 45–60 segments (two specimens washed ashore after a storm were longer than any previously recorded). Body divided into two more or less distinct regions, anterior inflated portion (anterior 15–17 setigers) tapered anteriorly, without dorsal and ventral cirri, and narrower attenuated posterior region with dorsal and ventral cirri. A more or less devel-

oped ventral groove along length of body, better developed in posterior region. Integument tesselated, with four annuli per segment. Prostomium subquadrangular, wider anteriorly, with frontal horns on anterolateral borders, with pair of evaginable nuchal organs lateral to prostomium (when inverted, appear as diagonal slits). Buccal segment achaetous, forming rugose ring around prostomium. Mouth ventral, at level of first setigerous lobes. Proboscis eversible, globular, smooth, unarmed. Branchiae four pairs, short, tufted, arborescent, inserted posterior to notopodia on setigers 2–5, increasing in size posteriorly. Noto- and neuropodial lobes of anterior segments small, projecting, subequal. Beginning on setigers 16–18, dorsal and ventral cirri develop gradually, becoming elongate-conical, flattened or inflated. Setae silky, iridescent, capillary (may be extra long in epitokous pelagic form). Lateral ciliated organs between rami. Pygidium with five to seven, short to long, deciduous, filiform anal cirri on ventral side. Epitokous sexual forms may appear in surface waters, massed with sexual products, with extra long setae and usually with highly pigmented dorsal and ventral cirri. Color: In life: Orange yellow. In alcohol: Without color, orange yellow, or sulfur yellow with darker pigmented masses in the outer portions of the dorsal and ventral cirri.

*Remarks.*—*Scalibregma brevicauda* Verrill is herein referred to *S. inflatum*. Although the types were not examined, specimens from the New England region identified by Verrill as *S. brevicauda* were observed. The types of *S. minutum* Webster and Benedict from Eastport, Maine, were examined and found to agree with *S. inflatum*.

*New records.*—Arctic Alaska: Point Barrow base, washed ashore; off Point Barrow base, 22.5–78 fms., up to 15 miles from shore, on bottoms of mud and various combinations of mud, sand, gravel, stones, rocks, with shells and worm tubes (9 stations, 17 specimens). West Coast North America: Washington and Puget Sounds, 25 fms., mud, Pettibone. East Coast North America: Off Labrador, 17–35 fms., *Blue Dolphin* Expeditions, 1950, 1951; off Nova Scotia, Maine, Massachusetts, Rhode Island, Connecticut, Long Island Sound, 5–95.5 fms., U. S. Fish Commission; Cuttyhunk, Massachusetts, low water, in sand, Pettibone, 1950.

*Distribution.*—Widely distributed in the Arctic: Siberian, Alaskan, and Canadian Arctic, Davis Strait, Greenland, Jan Mayen, Spitsbergen, Franz Josef Land, Novaya Zemlya, Kara Sea. Also Iceland, Faroes, Norway to France, Adriatic, Gulf of Oman; Labrador to Long Island Sound; Bering Sea to central California; north Japan Sea to Japan. Southern latitudes: New Zealand, Magellan Straits, South Georgia, Prince Edward Islands, Kerguelen. In low water to 1,333 fathoms; epitokes at surface.

## Family Opheliidae

Body relatively short, often grublike or lancet-shaped. Integument smooth or granulated; segmental grooves weak or obscured by superficial annuli. Prostomium small, conical, without appendages; pair of eversible nuchal organs (fig. 33, *l*, *o*). Proboscis eversible, saclike, unarmed. Parapodia biramous, lobes reduced or lacking; setae simple, capillary (fig. 33, *m*, *q*). Without dorsal cirri; rarely with ventral cirri. Branchiae paired, cirriform, inserted near parapodia, extending along most of body (may be lacking). Pygidium forming an anal cylinder, a flap, or knob, with or without cirri (fig. 33, *n*, *p*).

Represented by two genera and two species from Point Barrow. Both genera have paired cirriform branchiae along most of length of body; without lateral eyes along body.

### Key to the genera of Opheliidae from Point Barrow

1. Body lancet-shaped; ventral surface thick, solelike, formed by 2 thick longitudinal muscular columns, with midventral and lateral grooves along length of body. Parapodial lobes small, along lateral grooves (fig. 33, *m*).
**Ammotrypane** (p. 295)

Body cylindrical, grub-shaped, without midventral or lateral grooves. Parapodial lobes absent, the simple, capillary noto- and neurosetae emerging directly from body wall (fig. 33, *q*) ..... **Travisia** (p. 296)

## Genus *Ammotrypane* Rathke, 1843

### *Ammotrypane breviata* Ehlers, 1913

Figure 33, *l–n*

*Ammotrypane breviata* Ehlers, 1913, p. 523, pl. 39, figs. 1–7.—Monro, 1930, p. 165; 1936, p. 165.

*Ophelina groenlandica* Støp-Bowitz, 1948b, p. 20, fig. 6.

*Description.*—Length 6–7 mm., width 0.3 mm., setigerous segments 26 or 27 (up to 34 mm. long, 2 mm. wide, 26–28 segments—Monro, 1930, 1936). Body rigid, tapered at both ends, smooth, without superficial segmental divisions. Prostomium conical, the anterior tip constricted to form a small globular palpode; prostomial tip may be partly telescoped into rest of prostomium; pair of eversible nuchal organs at level of parapodia. Parapodia with two groups of fine capillary setae, the dorsal group slightly longer than the ventral. Branchiae begin on setiger 2, absent on last three to five setigers; branchiae slender, cirriform, subequal. Pygidium forming a short, somewhat contractile anal cylinder, closed on all sides, somewhat lobulate or papillate on open posterior end. Eversible proboscis saclike, smooth. Color: In alcohol: Without color or may be darkly pigmented laterally along posterior three setigerous segments and proximal part of anal tube.

*Remarks.*—The two small specimens from Point Barrow (6–7 mm. long) follow closely the description of Støp-Bowitz for *Ophelina groenlandica*, including size. They seem to agree with the description by Ehlers of *A. breviata* from the Antarctic, although the Antarctic specimens attain a much larger size (29 mm. long).

*New records.*—Arctic Alaska: Off Point Barrow base, up to 7.5 miles from shore, 29–36 fms., on bottoms of gravel, stones, large perforated rocks (2 stations, 2 specimens).

*Distribution.*—Arctic Alaska, East Greenland. Southern latitudes: South Orkney and Falkland Islands, Kaiser-Wilhelm II Land. In 10–214 fathoms.

## Genus *Travisia* Johnston, 1840

### *Travisia carnea* Verrill, 1873

Figure 33, *o–q*

*Travisia carnea* Verrill, 1873, pp. 431, 434, 508, 604; 1881, p. 302, pl. 8, fig. 1.—Sumner, Osburn, and Cole, 1913, p. 629.—Hartman, 1944a, pp. 336, 341, pl. 19, fig. 5 (as probably *Ophelia limacina*).

*Travisia forbesi* Murdoch, 1885, p. 154 (not *T. forbesii* Johnston, 1840).

*Description.*—Length up to 59 mm., width 8 mm., segments 25–29 (specimens washed ashore at Point Barrow much larger than any previously recorded). Body rounded, cylindrical, grub-shaped, tapered toward each end. Segments of posterior third may be somewhat imbricated or telescoped; triannulate in middle region. Integument with granulations or beading rather uniform (not larger on posterior part of segment as in *T. pupa* Moore). Prostomium small, conical, acutely to bluntly pointed, without eyes. Branchiae begin on setiger 2 (rarely on setiger 3), continuing posteriorly, absent on last four or five segments, cirriform, inserted posterior to notosetae. Without parapodial lobes, the small, slender, capillary noto- and neurosetae emerging directly from body wall. In posterior third of body, area in region of setae may be somewhat inflated but without enlarged lateral lobes extending posteriorly (as in *T. forbesii* Johnston and

---

Figure 33.—Cirratulidae: *a*, *Cirratulus cirratus*, dorsal view anterior end; *b*, same, parapodium from anterior region; *c*, same, acicular crotchet; *d*, *Chaetozone setosa*, dorsal view anterior end. Flabelligeridae: *e*, *Flabelligera affinis*, parapodium; *f*, same, hooked pseudocompound neuroseta; *g*, same, pedunculate papillae—(1) from tip of notopodium, (2) on body; *h*, *Brada inhabilis*, ventral view anterior end. Scalibregmidae: *i*, *Scalibregma inflatum*, dorsal view anterior end; *j*, same, parapodium from middle region; *k*, same, parapodium from posterior region. Opheliidae: *l*, *Ammotrypane breviata*, ventral view anterior end, proboscis extended; *m*, same, lateral view middle part of body; *n*, same, ventral view posterior end; *o*, *Travisia carnea*, dorsal view anterior end; *p*, same, dorsal view posterior end; *q*, same, parapodium. Capitellidae: *r*, *Capitella capitata*, dorsal view anterior end; *s*, same, dorsal view posterior part thoracic region; *t*, same, parapodium from abdominal region; *u*, same, hooded crotchet. (For explanation of symbols, see p. 210.)

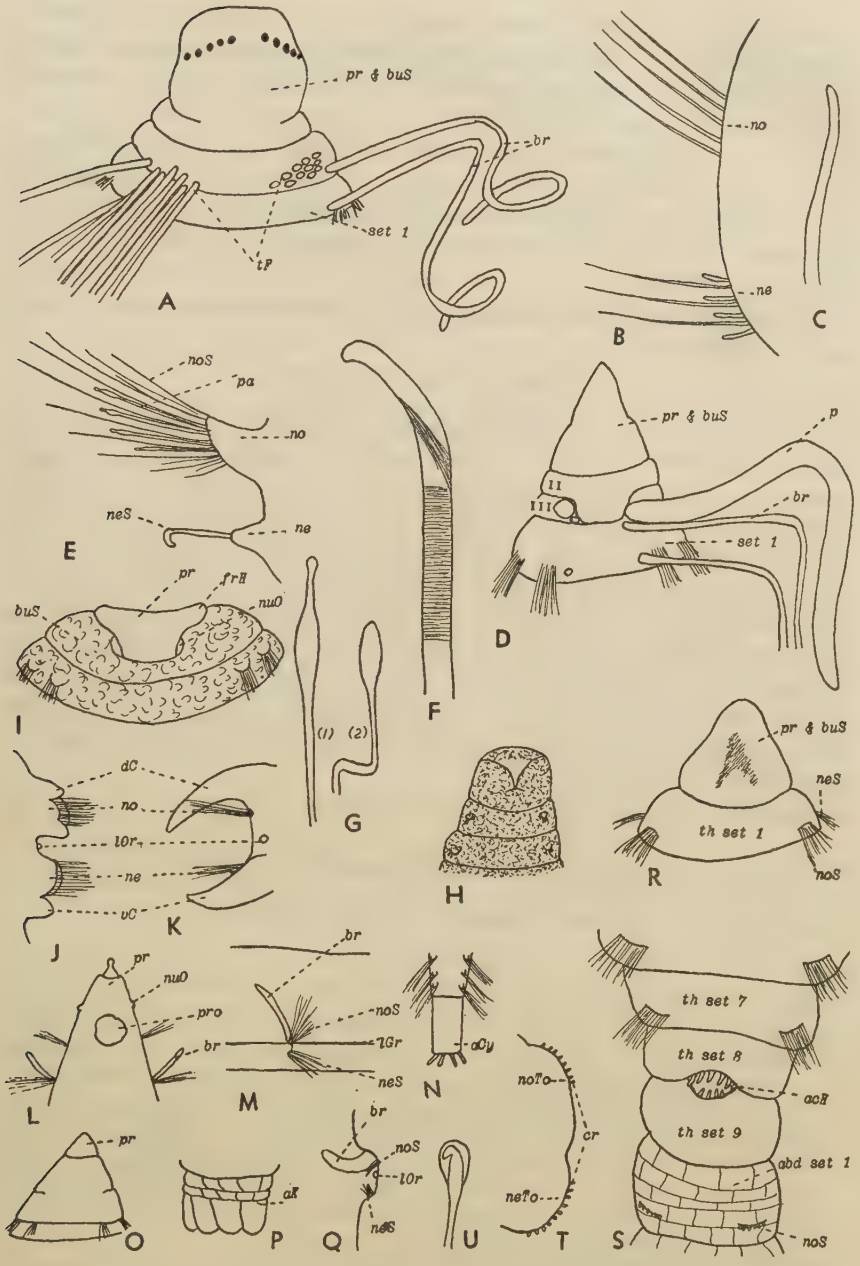


FIGURE 33.—For explanation see facing page.

*T. brevis* Moore). With lateral sensory pits between rami appearing as small oval slits. Nephridial pores ventral to neuropodia on setigers 3–14. Pygidium small, cylindrical, longitudinally furrowed. COLOR: In life: Flesh. In alcohol: Whitish.

*New records.*—ARCTIC ALASKA: Point Barrow base, washed ashore, October 16, 17, 1949; August 10, 1950 (12 specimens). EAST COAST NORTH AMERICA: Off Massachusetts, Long Island Sound, 3–19 fms., soft mud, U. S. Fish Commission; Woods Hole region, Massachusetts, Pettibone, 1950.

*Distribution.*—Arctic Alaska. Massachusetts to Long Island Sound. In 3–19 fathoms.

## Family CAPITELLIDAE

Body cylindrical, weakly divided into 2 regions: Anterior thoracic region somewhat inflated, often reticulated, parapodial lobes rudimentary; posterior abdominal region longer and thinner, with rows of crotchets on somewhat inflated tori. Prostomium conical, more or less retractile, without appendages, with or without eyes, with pair of eversible nuchal organs. Buccal segment achaetous (may be fused with prostomium as in *Capitella*). Parapodia biramous, reduced to bundles of capillary setae or to dorsal and ventral tori bearing row of crotchets which have long manubrium and recurved hooded rostrum (fig. 33, *r–u*). Without dorsal, ventral, or anal cirri. With or without branchiae. Proboscis eversible, globular, unarmed, papillate. Constructs tubes.

Represented by a single species from Point Barrow.

### Genus *Capitella* Blainville, 1828

#### *Capitella capitata* (Fabricius, 1780)

FIGURE 33, *r–u*

*Lumbricus capitatus* Fabricius, 1780, p. 279.

*Capitella capitata* Webster and Benedict, 1884, p. 730; 1887, p. 744.—Ehlers, 1913, p. 543.—Eliason, 1920, p. 63.—Fauvel, 1927, p. 154, fig. 55, a–h.—Augener, 1928, p. 749.—Monro, 1930, p. 163.—Annenkova, 1934, p. 322; 1937, p. 179; 1938, p. 189.—Hartman, 1942a, p. 69; 1944a, pp. 334, 341, pl. 34, fig. 3; 1945, p. 37; 1947, p. 404, pl. 43, figs. 1, 2; 1948, p. 41; 1951, p. 101.—Berkeley and Berkeley, 1943, p. 129; 1952, p. 100, figs. 206–208.—Gorbunov, 1946, p. 39.—Thorson, 1946, p. 110, fig. 60.—Zatsepin, 1948, p. 138, pl. 33, fig. 14.—Hartman and Reish, 1950, p. 40.—Wesenberg-Lund, 1950a, p. 39; 1950b, p. 91; 1951, p. 84.

*Capitella capitata* var. *antarctica* Monro, 1930, p. 164.

*Description.*—Length 23 mm., width 1 mm. (up to 120 mm.—Augener, 1928). Body attenuated slightly anteriorly, much more so posteriorly, fragile. Prostomium and achaetous buccal segment fused, forming wide obtuse cone, somewhat flattened dorsoventrally,

usually concave dorsally, with pair of small ventral eyes and pair of crescent-shaped nuchal slits behind eyes (best seen from lateral view). Thoracic region smooth, without reticulated integument, consisting of first 9 setigerous segments, each of first 7 with four bundles of capillary setae which on setiger 7 may be only capillaries, only crotchets, or both (in young specimens, crotchets may be present from setiger 4). Setigers 8 and 9 modified, having neuropodia with row of hooded crotchets, and with large, recurved, amber-colored acicular genital hooks located middorsally between these two segments. Abdominal segments with slightly raised dorsal and ventral parapodial tori each bearing a row of hooded crotchets. Without specialized branchiae or lateral organs. Pygidium a short ring, may be inflated. Color: In alcohol: Without color or reddish brown. Females with large yolky eggs (Point Barrow, August 9, 30, 1949; September 1, 6, 1949.)

*Remarks.*—According to Fauvel and others, in *C. capitata* the genital hooks on setigers 8 and 9 are present only in the males, the females having only crotchets. On all the specimens from Point Barrow, genital hooks are present, including some females containing large yolky eggs. They agree in all other respects with *C. capitata*. Having genital hooks in both males and females, they would fall under the very closely related *Capitellides* Mesnil. They differ from *C. giardi* Mesnil in the larger number of genital hooks. They are herein referred to the cosmopolitan *C. capitata* with the tentative idea that the relative development of genital hooks in the female may prove to be a variable character.

*New records.*—Arctic Alaska: Eluitkak Pass, Elson Lagoon near Point Barrow, 6.6 fms.; off Point Barrow base, up to 7.5 miles from shore, 23.3–70 fms., on bottoms of stones and various combinations of gravel, stones, rocks, large perforated rocks (8 stations, 26 specimens). Bering Sea: St. Paul Island, Pribilofs, in holdfasts with *Fabricia sabella* and lumbrinerids, W. L. Hahn, 1911. West Coast North America: Corona del Mar, California, from branchial cavity of crab, *Loxorhynchus grandis*, MacGinitie, 1948. East Coast North America: Off Labrador, 6 fms., mud-sand, *Blue Dolphin* Expedition, 1949; off Massachusetts, 15 fms., U. S. Fish Commission; Woods Hole region, Massachusetts, Pettibone, 1951.

*Distribution.*—Widely distributed in the Arctic: Siberian, Alaskan, and Canadian Arctic, Davis Strait, Greenland, Spitsbergen, Novaya Zemlya, Kara Sea. Also Iceland, Faroes, Norway to France, Madeira, Mediterranean, Black Sea; Hudson Bay to North Carolina, Texas; Bering Sea to southern California; north Japan Sea. Southern latitudes: Magellan Straits, South Georgia, Bouvet Island, South Africa, Kerguelen. In low water to 500 fathoms.

261112—54——7

## Family Arenicolidae

Body elongate, cylindrical, integument reticulated and divided into secondary annuli. Body divided into two or three distinct regions: (1) anterior, abranchial; (2) abdominal, branchial, each segment with pair of dorsally-borne branched gills; (3) caudal, achaetous and abranchial; this region may be lacking. Prostomium small, simple or trilobed, without appendages; with nuchal groove (fig. 34, *a*). Parapodia biramous; notopodia conical, setigerous, with spiny, capillary setae; neuropodia with sigmoid crotchets in semicircular tori. Without dorsal, ventral, and anal cirri. Anus terminal. Proboscis eversible, globular, papillate, unarmed. Constructs tubes or burrows.

Represented by a single species from Point Barrow.

### Genus *Arenicola* Lamark, 1801

#### *Arenicola glacialis* Murdoch, 1884

Figure 34, *a*

*Arenicola glacialis* Murdoch, 1884, p. 522; 1885, p. 155.—Ashworth, 1910, p. 24, figs. 10–14; 1912, p. 111, figs. 46, 47, pl. 6; 1924, p. 3, fig. 1.

*Description.*—Length up to 205 mm., width 11 mm., 17 setigerous segments. Body cylindrical, tapering slightly anteriorly and gradually posteriorly. Prostomium small, may be pretty well retracted in nuchal groove; median lobe small, lateral lobes larger, curved (fig. 34, *a*). Body divided into three regions: (1) anterior region of six abranchial setigers, notopodia conical with spiny capillary setae, neuropodia low tori with few sigmoid crotchets; (2) branchial region of 11 setigers each divided into five superficial annuli, with short, bushy, arborescent branchiae at base of conical notopodia, with gill axes short, branching one or two times or simple; neuropodia raised tori with long row of crotchets; on more posterior segments, tori approach midventral line; (3) caudal achaetous and abranchial region with papillae feebly developed, without processes (as in *A. cristata*). Nephridial pores six pairs, on setigers 4–9, posterior to upper part of neuropodial tori. Pair of statocysts on peristomium, open to exterior,

---

Figure 34.—Arenicolidae: *a*, *Arenicola glacialis*, prostomium. Maldanidae: *b*, *Praxillella praetermissa*, ventral view anterior end; *c*, same, frontal view cephalic plate; *d*, same, pygidial funnel; *e*, same, posterior end; *f*, same, crotchet from neuropodium; *g*, *Maldane sarsi*, lateral view anterior end; *h*, same, lateral view posterior end; *i*, *Nicomache lumbricalis*, lateral view anterior end; *j*, same, lateral view posterior end; *k*, *Nicomache personata*, lateral view posterior end; *l*, *Petaloproctus tenuis*, lateral view anterior end; *m*, same, lateral view posterior end. Sabellariidae: *n*, *Idanthyrsus armatus*, dorsal view anterior end; *o*, same, lateral view anterior end; *p*, same, palea from inner row; *q*, same, palea from outer row. (For explanation of symbols, see p. 210.)

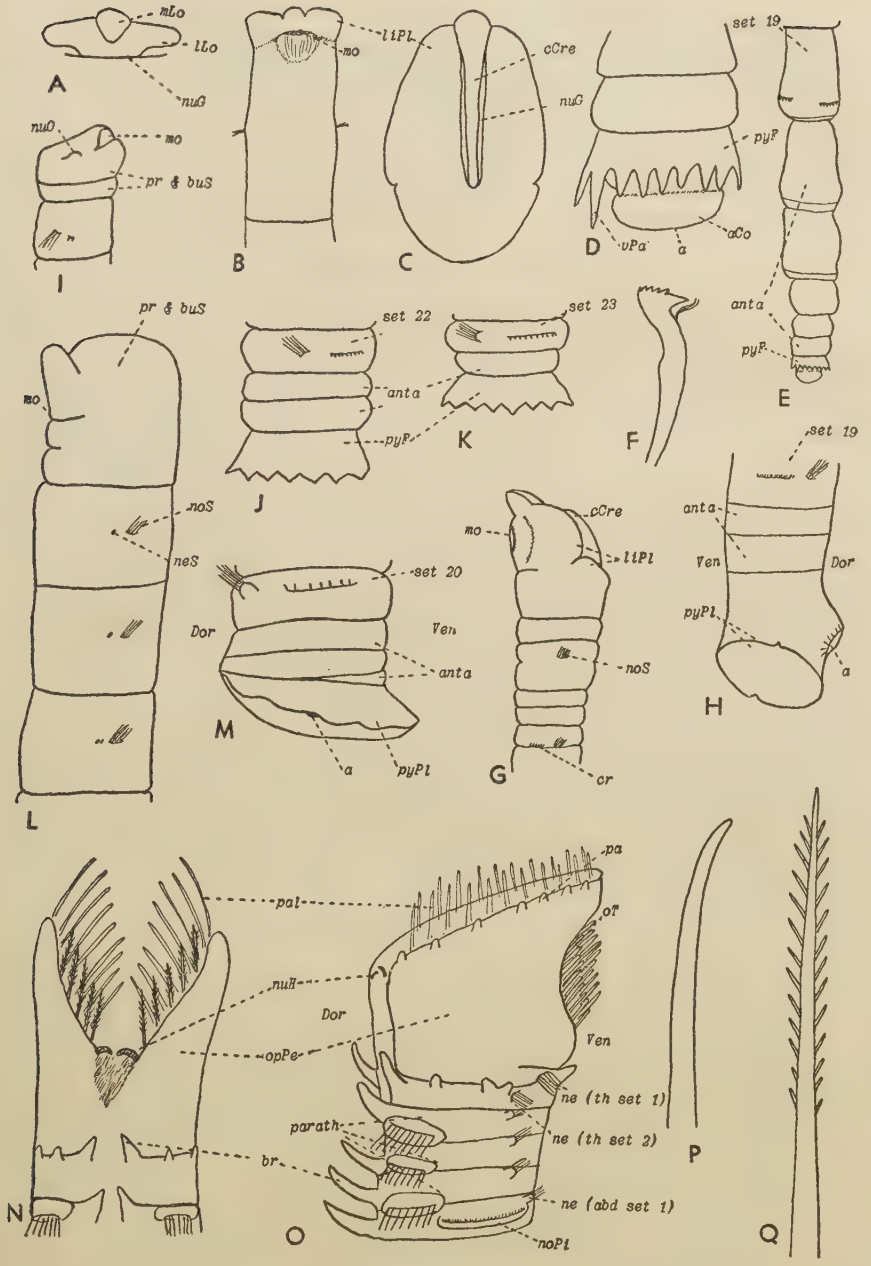


FIGURE 34.—For explanation see facing page.

with numerous sand grains as statoliths. Color: In life: Deep orange to brownish red. In alcohol: Bluish to grayish black or brown.

*New records.*—Arctic Alaska: Point Barrow base, washed ashore August 21, 24, 28, September 6, 12, 19, 22, October 16, 1949 (54 specimens); off Point Barrow base, along shore, 1.7 fms., on bottom of gravel with mud (2 stations, 3 specimens).

*Distribution.*—Alaskan and Canadian Arctic. In 1.7–3 fathoms.

## Family Maldanidae

Body cylindrical, truncated at both ends, without differentiated regions, segments usually few, some much longer than wide. Prostomium a small cephalic crest fused with achaetous buccal segment, forming ovoid head, without appendages, with or without oblique limbate brim or plate (fig. 34, *b*, *i*, *l*); pair of nuchal slits on either side cephalic crest. In anterior region with numerous glandular cells, diffused or grouped in clear bands alternating with pigmented rings. Parapodia biramous; notopodia with capillary setae; neuropodia with projecting tori bearing rows of crotchets (fig. 34, *f*) with dentate rostrum and rostral hairs; the crotchets may be replaced by few stout acicular spines on first few setigers. Without dorsal or ventral cirri; usually without branchiae. Pygidium a limbate plate, spatulate or funnellike (fig. 34, *h*, *j*, *m*). Proboscis eversible, unarmed, globular. Live in tubes in sand or mud; tube cylindrical, membranous, covered with thin to thick layer of mud, sand, gravel, more or less resistant.

Represented by four genera and five species from Point Barrow. All the genera are without specialized collarettes, without special glandular ventral shield on setiger 8, with neuropodial crotchets in single rows.

### Key to the genera of Maldanidae from Point Barrow

1. Head with limbate plate (fig. 34, *b*, *g*) ..... 2
   Head without limbate plate (fig. 34, *i*, *l*). With 1–2 stout acicular setae in neuropodia of first 3 setigers. Pygidium funnel-shaped or forming concave plate, with or without cirri; anus opening on surface of plate ..... 3
2. Head with low cephalic crest, bordered by oblique limbate plate, entire or notched laterally (fig. 34, *b*, *c*). With ventral crotchets beginning on setiger 1. Pygidium funnel-shaped, bordered with cirri, with anus in center of somewhat protruding anal cone within the funnel (fig. 34, *d*) ..... **Praxillella** (p. 303)
   Head with middorsal convex cephalic crest or keel, bordered by limbate plate, divided into 3 parts by 2 deep lateral grooves (fig. 34, *g*). Without neurosetae on setiger 1; crotchets begin on setiger 2. Pygidium a slightly oblique oval plate, bordered by rim which is incised laterally, smooth or denticled; anus dorsal to pygidial disc (fig. 34, *h*) ..... **Maldane** (p. 303)
3. Pygidium slightly oblique, funnel-shaped, bordered with cirri (fig. 34, *j*, *k*). **Nicomache** (p. 304)
   Pygidium an asymmetrical, foliaceous, concave plate, reduced dorsally, wider ventrally, with border smooth or crenulate (fig. 34, *m*) ..... **Petaloproctus** (p. 306)

## Genus *Praxillella* Verrill, 1881

### *Praxillella praetermissa* (Malmgren, 1865)

FIGURE 34, *b–f*

*Praxilla praetermissa* Malmgren, 1865, p. 191; 1867, p. 100, pl. 11, fig. 62.
*Praxillella praetermissa* Verrill, 1881, pp. 298, 305, 309, 312.—Webster and Benedict, 1887, p. 746.—Arwidsson, 1907, p. 192, figs.—Eliason, 1920, p. 66.—Augener, 1928, p. 762.—Annenkova, 1937, p. 182; 1938, p. 194.—Zatsepin, 1948, p. 142, pl. 35, fig. 1.—Wesenberg-Lund, 1948, p. 41, figs. 20, 21; 1950a, p. 43; 1950b, p. 98; 1951, p. 93.
*Clymene* (*Praxillella*) *praetermissa* Fauvel, 1927, p. 179, fig. 62, *a–e*.

*Description.*—Length 45 mm., width 1 mm. (up to 120 mm. long, 2.5 mm. wide—Malmgren, 1865), 19 setigerous segments, 4–5 achaetous segments with rudimentary parapodia. Head with oblique limbate plate, with border entire, slightly or deeply incised laterally, slightly incised posteriorly, terminating anteroventrally in obtuse cone (not produced into digitiform process); median cephalic crest long; nuchal grooves one-half to two-thirds its length. Neuropodia of anterior three setigers with 2–10 slightly modified crotchets. Pygidial funnel with flat floor, with projecting anal cone with larger valvule on ventral side of cone; border of funnel with 20–38 subequal papillae except for a longer ventral one. Proboscis papillate basally. COLOR: In life: Yellow with wide, red and white bands on some anterior segments. In alcohol: Brownish to gray, with whitish bands anterior to setae on setigers 4–8. TUBE: Of clay, sand, small bits of rock; may be quite resistant.

*New records.*—ARCTIC ALASKA: Off Point Barrow base, up to 7.5 miles from shore, 20–36 fms., on various combinations of mud, sand, gravel, stones, rocks, large perforated rocks, shells (7 stations, 10 specimens). EAST COAST NORTH AMERICA: Off Labrador, 5–8 fms., *Blue Dolphin* Expedition, 1949; off Cape Cod, Massachusetts, 14–19 fms., U. S. Fish Commission.

*Distribution.*—Widely distributed in the Arctic: Alaskan Arctic, Davis Strait, Greenland, Spitsbergen, White Sea, Novaya Zemlya, Kara Sea. Also Iceland, Faroes to English Channel, Mediterranean; Labrador to Massachusetts; north Japan Sea. In 7–1,111 fathoms.

## Genus *Maldane* Grube, 1860

### *Maldane sarsi* Malmgren, 1865

FIGURE 34, *g, h*

*Maldane sarsi* Malmgren, 1865, p. 188; 1867, p. 99, pl. 10, fig. 57.—Arwidsson, 1907, p. 251, figs.—Eliason, 1920, p. 66.—Fauvel, 1927, p. 197, fig. 69, a–i; 1932, p. 202.—Augener, 1928, p. 759.—Annenkova, 1937, p. 179; 1938, p. 192.—Okuda, 1939, p. 239.—Berkeley and Berkeley, 1942, p. 199.—Hartman,

1944a, pp. 335, 342, pl. 33, figs. 3, 4; 1951, p. 106.—Zatsepin, 1948, p. 142, pl. 33, fig. 3.—Wesenberg-Lund, 1948, p. 48, figs. 24, 25; 1950a, p. 44; 1950b, p. 100; 1951, p. 94.—Hartman and Reish, 1950, p. 37.

*Maldane sarsi* var. *antarctica* Arwidsson, 1911a, p. 32, figs.—Munro, 1930, p. 169; 1936, p. 168.

*Maldane sarsi* var. Moore, 1923, p. 237.

*Maldane sarsi* var. *tropica* Monro, 1937, p. 307, fig. 24.

*Description.*—Length up to 110 mm., width 3.9 mm., setigerous segments 19, two antanal achaetous segments. Head with long, convex keel, ending in blunt process above mouth, bordered by limbate plate, with border smooth, usually incised laterally, rather high posteriorly; nuchal organs short, divergent; without ocelli. Anterior segments biannulate. With notosetae only on first setiger; neuropodial crotchets begin on setiger 2. Two antanal segments short, with achaetous tori slightly marked. Pygidium an oblique flat, oval plate, with border usually slightly incised laterally, smooth or slightly crenulate ventrally. Anus a folded cushion dorsal to and close to pygidial rim. TUBE: Free, circular, thin to thick walled, of fine agglomerated mud and sand grains.

*New Records.*—ARCTIC ALASKA: Off Point Barrow base, 3 miles from shore, 20.3 fms., on bottom of mud, gravel, stones, shells (1 station, 1 specimen). BERING SEA: *Albatross* Sta. 3603, 55°23′ N., 170°31′ W., 1,771 fms., 1895. CANADIAN ARCTIC: Northwest shore Daniels Island, mouth Newell Sound, Frobisher Bay, Baffin Land, 10–30 fms., Bartlett. EAST COAST NORTH AMERICA: Off Labrador, 30 fms., *Blue Dolphin* Expedition, 1950; off Nova Scotia, Maine, Massachusetts, Rhode Island, 14–487 fms., U. S. Fish Commission.,

*Distribution.*—Widely distributed in the Arctic: Siberian, Alaskan and Canadian Arctic, Davis Strait, Greenland, Spitsbergen, Novaya Zemlya, Kara Sea. Also Iceland, Norway to France; Labrador to Rhode Island, Louisiana, Mississippi, eastern Texas; Bering Sea to southern California; north Japan Sea to Japan; South Arabian coast (var. *tropica*); Bay of Bengal. Southern latitudes: South Georgia, South Shetlands, Palmer Archipelago (var. *antarctica*); south Australia. In low water to 1,771 fathoms.

### Genus *Nicomache* Malmgren, 1865

Both species have buccal segment fused with prostomium forming hood-shaped head, irregularly rounded, with thickened anteroventral border, forming projecting upper lip (fig. 34, *i*). First three setigerous segments each with one or two stout, acicular, spinelike neurosetae. Some of notopodia with long, hairlike sinuous dorsal setae. Pygidium with anus terminal in center of short, slightly oblique funnel, with papillae on border of funnel (fig. 34, *j*, *k*).

## Key to the species of Nicomache from Point Barrow

1. Single achaetous antanal segment (fig. 34, *k*)----------**N. personata**
   Two achaetous antanal segments (fig. 34, *j*)----------**N. lumbricalis**

### *Nicomache lumbricalis* (Fabricius, 1780)

FIGURE 34, *i*, *j*

*Sabella lumbricalis* Fabricius, 1780, p. 374.

*Nicomache lumbricalis* Malmgren, 1867, p. 99, pl. 10, fig. 60.—Webster and Benedict, 1884, p. 731; 1887, p. 745.—Arwidsson, 1907, p. 86, pl. 8, figs. 244, 245.—Fauvel, 1927, p. 190, fig. 66, a–i.—Augener, 1928, p. 764.—Monro, 1930, p. 173.—Annenkova, 1934, p. 322; 1937, p. 181; 1938, p. 193.—Hartman, 1944a, pp. 335, 342; 1948, p. 42.—Zatsepin, 1948, p. 144, pl. 26, fig. 1.—Wesenberg-Lund, 1948, p. 23, figs. 10, 11; 1950a, p. 41; 1950b, p. 95; 1951, p. 90.—Berkeley and Berkeley, 1952, p. 54, figs. 111, 112.

*Nicomache carinata* Moore, 1906b, p. 242, pl. 11, figs. 36–39, pl. 12, figs. 43, 44; 1923, p. 227.

*Nicomache lumbricalis* var. *borealis* Arwidsson, 1907, p. 94, figs.; 1922, p. 6.—Eliason, 1920, p. 65.

*Description.*—Length 40–60 mm., width 2.5–3 mm., setigerous segments 21–22, two short achaetous antanal segments (Point Barrow and Labrador specimens with 22 setigers; type of *N. carinata* with 21; up to 160 mm. long, 5 mm. wide—Fauvel, 1927). Prostomium without ocelli; nuchal organs S-shaped. Pygidial funnel with 14–30 subequal, pointed, triangular papillae. COLOR: In alcohol: Reddish brown on sides and dorsal surface of head and first three setigers. TUBE: Sandy, with small pieces of rock, with smooth membranous lining (Point Barrow), or thick, sandy, and coiled (Labrador; small ones on terebellid tubes).

*Remarks.*—They may share their tubes with the commensal polynoid *Enipo gracilis* Verrill (=*E. cirrata* Treadwell) reported by Berkeley and Berkeley from Alaska; also from off Nova Scotia and Massachusetts (in USNM).

*New records.*—ARCTIC ALASKA: Off Point Barrow, up to 12.1 miles from shore, 24.7–123.5 fms., on bottoms of mud, worm tubes, stones, and various combinations of rocks, stones, gravel (6 stations, 18 specimens). BERING SEA: Cape Prince of Wales, 23 fms., Dall, 1874. *Albatross* Sta. 3311, 53° 59′ N., 166° 29′ W., 85 fms., and Sta. 3313, 54° 01′ N., 166° 27′ W., 68 fms., 1890. ALASKA: *Albatross* Sta. 2848, Unalaska to Cook Island, 1888; Eastern Harbor, Sitka, 15 fms., Dall, 1874. KAMCHATKA: *Albatross* Sta. 3644, 51° 09′ N., 157° 48′ W., 96 fms., 1896. EAST COAST NORTH AMERICA: Off Labrador, 30–125 fms., *Blue Dolphin* Expeditions, 1949, 1950, 1951; off Nova Scotia, Bay of Fundy, Maine, New Hampshire, Massachusetts, 26–150 fms., U. S. Fish Commission.

*Distribution.*—Widely distributed in the Arctic: Siberian and

Alaskan Arctic, Greenland, Jan Mayen, Spitsbergen, White Sea, Novaya Zemlya, Kara Sea. Also Bering Sea to Lower California; north Japan Sea; Iceland, Norway to English Channel, Santander; Labrador to Massachusetts; South Africa. In low water to 1,400 fathoms.

### *Nicomache personata* Johnson, 1901

FIGURE 34, *k*

*Nicomache personata* Johnson, 1901, p. 419, pl. 13, figs. 134–139.—Arwidsson, 1922, p. 7, pl. 1, figs. 5, 6.—Hartman, 1948, p. 41, fig. 11, d–g.—Berkeley and Berkeley, 1952, p. 54, figs. 109, 110.

*Nicomache minor* Arwidsson, 1907, p. 100, pl. 2, figs. 68–73; pl. 8, figs. 252–256.—Augener, 1928, p. 765.—Annenkova, 1937, p. 181; 1938, p. 193.

*Nicomache maculata* Arwidsson, 1911b, p. 209, pl. 18, figs. 13–19; pl. 19, figs. 27–30.—Fauvel, 1927, p. 191, fig. 66, k–r.

*Description.*—Up to 110 mm. long, 2 mm. wide, 22 or 23 setigerous segments, single achaetous antanal segment (Point Barrow specimen with 23 setigers, Puget Sound specimen with 22). Prostomium with numerous ocelli (may be absent); nuchal clefts short, arched. Pygidial funnel with 16-26 papillae which are short, subequal, triangular, or very unequal, some being longer, some very short, few may be bifid or trifid. COLOR: In alcohol: Without color, or brownish, especially on anterior end. TUBE: Thick walls of coarse sand particles cemented together.

*New records.*—ARCTIC ALASKA: Off Point Barrow base, up to 8 miles from shore, 21.7–75.5 fms., on various combinations of pebbles, rocks, gravel, stones (3 stations, 5 specimens). BERING SEA: *Albatross* Sta. 3289, 56° 44′ N., 159° 16′ W., 16 fms., 1890. WEST COAST NORTH AMERICA: Security Bay, Alaska, Jones; Washington and Puget Sounds, low water to 61 fms., Pettibone.

*Distribution.*—Arctic Alaska, Spitsbergen; Bering Sea to Washington; north Japan Sea; Scandinavia, Ireland, North Sea to English Channel. In low water to 75.5 fathoms.

## Genus *Petaloproctus* Quatrefages, 1865

### *Petaloproctus tenuis* (Théel, 1879)

FIGURE 34, *l*, *m*

*Maldane tenuis* Théel, 1879, p. 57, pl. 4, figs. 52–54.

*Maldane filifera* Verrill, 1879, p. 179.

*Petaloproctus tenuis* Arwidsson, 1907, p. 114, pl. 6, fig. 190a.—Annenkova, 1937, p. 181; 1938, p. 193.—Zatsepin, 1948, p. 145, pl. 34, fig. 5.—Wesenberg-Lund, 1948, p. 31.—Berkeley and Berkeley, 1952, p. 55, fig. 113.

*Petaloproctus tenuis* var. *borealis* Arwidsson, 1907, p. 118, pl. 3, figs. 85–90; pl. 8, figs. 268–272.—Eliason, 1920, p. 66.—Hartman, 1948, p. 42.—Berkeley and Berkeley, 1952, p. 56, figs. 114–116.

*Petaloproctus filifer* Hartman, 1942b, p. 131, fig. 11, a–b.

*Description.*—Length 18 mm., width 0.5 mm., 20–21 setigerous segments, single achaetous antanal segment (may appear as two or three on longer ventral side). Prostomium rounded, with convex median ridge and anteroventrally extended brim. First three setigers with one or two acicular neurosetae; with some long, threadlike, sinuous notosetae covered with spinules. Pygidium with oblique, slightly concave, disclike, asymmetrical plate (absent dorsally), wide on ventral side, with rim smooth or slightly crenulate; anal opening terminal.

*Remarks.*—The Point Barrow specimen agrees with the stem form of *P. tenuis*, with 20 setigerous segments and the rim of the pygidial disc slightly crenulate (in var. *borealis* and *filifer* there are 21 setigers and the rim of the pygidial disc is smooth).

*New records.*—Arctic Alaska: Off Point Barrow base, 16 miles from shore, 78.2 fms., on bottom of worm tubes, few rocks (1 station, 1 specimen). Canadian Arctic: Ducketts Cove, Hurd Channel, Melville Peninsula, 1–14 fms., in sandy tubes on empty tubes of *Pectinaria*, Bartlett, 1933. Greenland: Small bay, Camp No. 2, Nugsuak Peninsula, 74°7′ N., on empty tubes of *Pectinaria*, J. C. Martin, 1897.

*Distribution.*—Scattered records in the Arctic: Alaskan and Canadian Arctic, East Greenland, Spitsbergen, Novaya Zemlya. Also off Cape Cod, Massachusetts; southeastern Alaska to British Columbia; north Japan Sea. In 1–833 fathoms.

## Family Sabellariidae

Body divided into three regions: (1) anterior thoracic region including two anterior thoracic segments with parapodia reduced to neuropodia with capillary setae and two large, more or less fused, heavy columns, the opercular peduncles, directed anteriorly, bearing very modified setae arranged in one to three concentric rows and forming an operculum for closing opening of tube; three or four parathoracic biramous segments with capillary neurosetae and paddlelike or styliform notosetae and dorsal falciform branchiae (fig. 34, n–q); (2) abdominal region with notopodia in form of broadly flattened pinnules bearing pectinate uncini, and neuropodia with capillary setae; with dorsal, simple, ligulate or falciform branchiae; (3) caudal region, achaetous, apodous, cylindrical, without appearance of segmentation. Prostomium indistinct, between opercular peduncles, with pair of palps and usually a median tentacle. Mouth unarmed, usually surrounded with numerous filiform tentacles. Tube of sand or fine gravel, concreted, resistant, may be solitary or colonial, constructing sandy reefs.

Represented by a single species from Point Barrow.

## Genus *Idanthyrsus* Kinberg, 1867

### *Idanthyrsus armatus* Kinberg, 1867

FIGURE 34, *n–q*

*Idanthyrsus armatus* Kinberg, 1867, p. 350.—Johansson, 1926, p. 9; 1927, p. 90.—Monro, 1930, p. 117, fig. 73; 1936, p. 172.—Annenkova, 1937, p. 184; 1938, p. 196.—Okuda, 1938a, p. 242, figs. 4, 5.—Hartman, 1944c, p. 336, pl. 31, fig. 36.—Berkeley and Berkeley, 1952, p. 107, figs. 220–222.

*Idanthyrsus ornamentatus* Chamberlin, 1919, p. 262, pl. 3, figs. 2–5.—Hartman, 1944c, p. 337, pl. 31, fig. 34; 1948, p. 43.—Hartman and Reish, 1950, p. 41.

*Description.*—Length up to 60 mm., width 5 mm., caudal lobe 11 mm. Body widest anteriorly, tapering gradually posteriorly, with achaetous caudal region sharply set off from body. Opercular peduncles elongated, semicylindrical, completely separated and divergent anteriorly, obliquely truncated distally, with two rows modified golden setae or paleae; inner row paleae rather stout, smooth, gently curved, tapering gradually to acute tips, 7–16 per column; outer row paleae more slender, straight or slightly curved, with coarse lateral spines, 16–36 per column; row of 9–15 distal papillae per column, at base of outer paleae. One or two pairs heavy, deep amber-colored, strongly-bent nuchal hooks on dorsal side opercular peduncles. Numerous filiform oral tentacles on ventral side opercular peduncles. Pair of grooved slender palps and median tentacle between bases of peduncles. First thoracic segment short, with ventral group capillary setae lateral to conical papilla. Second segment with lateral group capillary setae, three papillae and dorsal branchiae. Three parathoracic segments with rectangular palletlike pinnules with flattened, paddlelike notosetae; neurosetae bipinnate capillary setae. Abdominal segments with wide, flattened dorsal pinnules bearing pectinate uncini; capillary barbed neurosetae. Caudal lobe smooth, achaetous. Paired dorsal branchiae cirriform, with transverse ridges on medial side, begin on setiger 2, absent on last few abdominal segments. COLOR: In life: Reddish brown to dark violet anteriorly, branchiae red, paleae golden yellow. In alcohol: Colorless, with purple patches anteriorly. TUBE: Thick, of coarse sand grains neatly cemented together, very resistant, one side flattened, attached to rocks, shells, crustaceans; upper surface convex.

*Remarks.*—*I. ornamentatus* Chamberlin is herein referred to *I. armatus*, following Okuda (1938). According to observations by G. E. MacGinitie it is a hardy species, a specimen living in a pail in the laboratory for three days, on a rock covered with a mass of barnacles, etc. Male specimen, collected from 70 fathoms, spawned in the laboratory August 9, 1949.

*New records.*—Arctic Alaska: Off Point Barrow base, up to 7 miles from shore, 4.3–70 fms., on bottoms of mud, and gravel, stones (3 stations, 6 specimens). Bering Sea: Bering Island, N. Grebintzky, 1884. West Coast North America: *Albatross* Sta. 2842, 54°15′ N., 166°3′ W., 72 fms.; Washington and Puget Sounds, 10–110 fms., Pettibone.

*Distribution.*—Arctic Alaska, Bering Sea to Panamá; north Japan Sea to Japan; west coast South America (Chile), Straits of Magellan, Falkland Islands. In low water to 110 fathoms.

## Family Sternaspidae

Body very short, grublike, aberrant; segments few, uniramous or achaetous, without parapodial lobes (fig. 35, *a*). Prostomium reduced to small rounded tubercle, without appendages. Mouth rounded, subterminal, ventral to prostomium. Body divided into three regions: (1) anterior, with complete rings, with lateral concentric rows of strong acicular yellow setae on anterior three segments (anterior region may be retracted into more posterior segments); (2) middle, with segmental divisions absent on midventral part, without setae visible externally; (3) posterior, with ventral horny shield formed by two trapezoidal plates provided on their external sides with radiating bundles of stiff, barbed and smooth capillary setae (fig. 35, *b*). Numerous, long, filiform anal branchiae, inserted on posterior end. Anus terminal. Lives in mud.

Represented by a single species from Point Barrow (the family is usually considered to have a single cosmopolitan species).

### Genus *Sternaspis* Otto, 1821

#### *Sternaspis scutata* (Ranzani, 1817)

Figure 35, *a*, *b*

*Thalassema scutata* Ranzani, 1817, p. 1457, pl. 11, figs. 10–13.
*Sternaspis fossor* Stimpson, 1854, p. 29, pl. 2, fig. 19.—Webster and Benedict, 1884, p. 725.—Moore, 1909b, p. 144; 1923, p. 218.—Hartman, 1944a, pp. 336, 342, pl. 33, fig. 15.—Berkeley and Berkeley, 1952, p. 59, fig. 123.
*Sternaspis islandica* Malmgren, 1867, p. 87, pl. 14, fig. 85.
*Sternaspis scutata* Moore, 1903, p. 487; 1908, p. 357; 1923, p. 218.—Fauvel, 1927, p. 216, fig. 76, a–g; 1932, p. 213; 1933, p. 52; 1934a, p. 60.—Monro, 1930, p. 178.—Annenkova, 1937, p. 185; 1938, p. 196.—Hartman, 1942c, p. 102.—Gorbunov, 1946, p. 39.—Wesenberg-Lund, 1949, p. 345; 1950a, p. 46; 1950b, p. 104; 1951, p. 98.—Hartman and Reish, 1950, p. 38.
*Sternaspis scutata* var. *africana* Monro, 1930, p. 179.

*Description.*—Up to 31 mm. long, 14 mm. wide. Body variable in shape; may be inflated at both ends, anterior region may be retracted into more posterior segments. Integument densely pilose, covered with fine filiform papillae. Anterior region of seven segments; segments 1 and 5–7 achaetous; segments 2–4 each with lateral semicircular row of strong, short, yellow setae which are arched, pointed to blunt (worn down), diminishing in size toward ventral side; pair of long genital papillae on segment 7. Middle region of six segments, well defined except for narrow midventral strip, with bundles of capillary setae embedded in body wall. Posterior region with five or more segments, with ventral horny trapezoidal plates showing concentric and radiating striae, each plate with 16 radiating bundles of stiff setae, 9 on lateral and 7 on posterior borders. Anal filaments or branchiae very numerous, long, filiform, sometimes spiralled. Color: In alcohol: Without color or brownish, with rusty-red ventral shield.

*New records.*—Arctic Alaska: Off Point Barrow base, up to 5 miles from shore, 1.7–24.7 fms., on bottoms of mud and gravel with mud (3 stations, 5 specimens). Bering Sea: 63°37′ N., 165°19′ W., 12 fms., Stoney, 1884; off mouth Yukon River, 3 fms., E. W. Nelson, 1877. Alaska: Iluiliuk Harbor, Unalaska, Dall, 1871; *Albatross* Sta. 3340, 55°26′ N., 155°26′ W., 695 fms., and Sta. 3330, 54° N., 166°53′ W., 351 fms., 1890. Chiachi Islands, 20 fms., 1874; off Round Island, Coal Harbor, Unga Island, 6–8 fms., 1872; Eastern Harbor, Sitka, 15 fms., gravelly-mud, 1874; all collected by Dall. West Coast North America: Washington and Puget Sounds, 10–111 fms., mud, Pettibone. East Coast North America: Nova Scotia, Maine, Massachusetts, 5–102 fms., U. S. Fish Commission.

*Distribution.*—Scattered records in the Arctic: Siberian and Alaskan Arctic, Greenland. Also Iceland to English Channel, Mediterranean, Adriatic, Gulf of Oman, Persian Gulf; Nova Scotia to Massachusetts; Bering Sea to Panamá; north Japan Sea to Japan, China. Southern latitudes: South Shetlands, Palmer Archipelago, South Orkneys, South Georgia, west Africa, Indian Ocean, Australia, New Zealand. In 1.7–766 fathoms.

## Family Pectinariidae (Amphictenidae)

Body short, conical, with segments few in number. Prostomium indistinct, fused with buccal segment forming a truncate anterior end provided with two bundles of paleae (large, flattened, golden setae) in a horizontal row directed obliquely anteriorly, forming an operculum for the tube or as a fork for digging in sand or mud; ventral to paleae, an antennular or tentacular membrane bordered or not with short to long filiform papillae, surrounding numerous prehensile oral tentacles

not retractile in mouth; dorsal and posterior to paleae a semilunar flat or concave cephalic plate limited posteriorly by an entire or crenulate rim; two pairs tentacular cirri with first pair lateral to base of paleae, second pair lateral to rim of cephalic plate (fig. 35, *c*, *d*). Body divided into three regions: (1) anterior thoracic, including two achaetous segments each with a pair of lateral pectinate branchiae, three notopodial uniramous setigers lacking neuropodia; ventral side anterior region with thick glandular cushions; (2) median abdominal, with biramous segments (except last few may have notosetae only), notopodia with setae capillary, limbate, smooth or finely denticled; neuropodia in form of wide pinnules bearing single row of pectiniform uncini; (3) posterior anal plaque or scapha, small, foliaceous, concave dorsally, folded under abdomen, with rudimentary achaetous segments except for the first segment which has a series of acicular, more or less recurved setae (the scaphal hooks); an oval or filiform ligule above the anus (fig. 35, *g*, *h*). Tube free, conical, rigid, fragile, open at both ends, straight or arcuate, formed of a single layer of cemented sand grains or shells, and lined by a membrane. Live in sand or mud, with anterior and larger end of tube directed below. May secrete mucus in abundance.

Represented by a single genus (and subgenus) and two species from Point Barrow.

### Genus *Pectinaria* Lamark, 1818

#### Subgenus *Cistenides* Malmgren, 1865

Both species have the tube slightly arched, lined with rusty-colored membrane. Tentacular membrane free, the lateral portions not fused to paleal segment, with 30–45 filiform to clavate marginal papillae. Oral tentacles short, thick, grooved. Dorsal rim of flat paleal segment entire, not denticled (fig. 35, *d*). Usually 17 segments with capillary notosetae (15–17, the last two segments may have the notosetae few in number or lacking), of which 12 (beginning on setiger 4) have elongate flattened pinnules bearing single rows of neuropodial uncini; pectiniform uncini thin, flat, with 3–4 major teeth and 4–5 small ones above basal process (fig. 35, *f*). Anal plaque distinctly separated from abdomen by constriction, suboval, festooned laterally (rudimentary parapodia); basally with 7–11 pairs short, heavy scaphal hooks (fig. 35, *g*).

#### Key to the species of Pectinaria (Cistenides) from Point Barrow

1. Cephalic paleae usually 7–9 pairs (7–13), heavy, with blunt tips (or very short sharp tips; fig. 35, *i*, *j*) ..... **P. (C.) granulata**
   Cephalic paleae usually 11–14 pairs (9–15), long, tapered to slender pointed tips (fig. 35, *e*) ..... **P. (C.) hyperborea**

### *Pectinaria (Cistenides) granulata* (Linné, 1767)

FIGURE 35, *i–k*

*Sabella granulata* Linné, 1767, p. 1268.
*Cistenides granulata* Malmgren, 1865, p. 359.—Webster and Benedict, 1887, p. 747.—Chamberlin, 1920, p. 25.—Berkeley and Berkeley, 1942, p. 200.—Hartman, 1944a, pp. 335, 342.—Wesenberg-Lund, 1950b, p. 105; 1951, p. 99.
*Pectinaria brevicoma* Johnson, 1901, p. 423, pl. 15, figs. 151–156.—Not Moore, 1923, p. 216 (=*P. californiensis* Hartman; in USNM).
*Pectinaria (Cistenides) granulata* Hessle, 1917, p. 77.—Nilsson, 1928, p. 28, fig. 8.—Annenkova, 1937, p. 186; 1938, p. 198.—Treadwell, 1937, p. 32.
*Cistenides brevicoma* Hartman, 1941b, p. 331, pl. 50, figs. 13, 14, 16; pl. 52, fig. 23; 1944b, p. 268.
*Pectinaria (Cistenides) brevicoma* Berkeley and Berkeley, 1952, p. 106, figs. 218, 219.

*Description.*—Body 20–52 mm. long, 6–8 mm. wide. Tube 38–52 mm. long, 7–8 mm. in greatest diameter, of rather coarse sand grains, nearly uniform in size. Paleae usually 8 or 9 pairs (7–13), short, heavy, with tips blunt (may have short, sharp tips). Scaphal hooks strongly hooked, with a distinct shoulder. COLOR: In life: Colorless, transparent, with reddish-orange internal organs, red branchiae, golden paleae.

*New records.*—ARCTIC ALASKA: Eluitkak Pass, Elson Lagoon near Point Barrow, stony; Point Barrow base, washed ashore; off Point Barrow base, up to 12.1 miles from shore, 3.7–123.5 fms., on bottoms of mud, stones, mass of worm tubes, and various combinations of mud, sand, gravel, rocks, stones, large perforated rocks, shells (17 stations, 53 specimens); 10 miles west Point Franklin, 13.5 fms., sand, Point Barrow Expedition, 1883. KAMCHATKA: Petropavlovsk, Grebintzky, 1883. BERING SEA: Atka Island, Aleutians, Turner, 1879; Bering Straits, 13 fms., Dall, 1880. ALASKA: Chichagof Harbor, Attu Island, 5–7 fms., 1873; Coal Harbor, Unga Island, 1872; and Port Etches, 12–18 fms., 1874; all collected by Dall. Kodiak, Fisher; Wrangel, Jones. WASHINGTON: Puget Sound, 39–83 fms., mud, rocks, shells, Pettibone. CANADIAN ARCTIC: Kneeland Bay, Frobisher Bay, Baffin Island, and off Daniels Island, Newell Sound, Frobisher Bay, 10–30 fms., Bartlett, 1942. NORTHWEST GREENLAND: Off Conical Rock, 76° N., 67°30′ W., 20–40 fms., 1938; between Parker Snow Bay and Conical Rock, 25–45 fms., 1940; west side Wolstemholm Island, 12 fms., 1940; all collected by Bartlett. EAST COAST NORTH AMERICA: Off Labrador, 6–12 fms., *Blue Dolphin* Expeditions, 1949, 1950, 1951; off New Brunswick, Nova Scotia, Maine, New Hampshire, Massachusetts, Long Island Sound, 5–190 fms., U. S. Fish Commission.

*Distribution.*—Widely distributed in the Arctic: Siberian, Alaskan, and Canadian Arctic, Greenland, Spitsbergen, Novaya Zemlya. Also

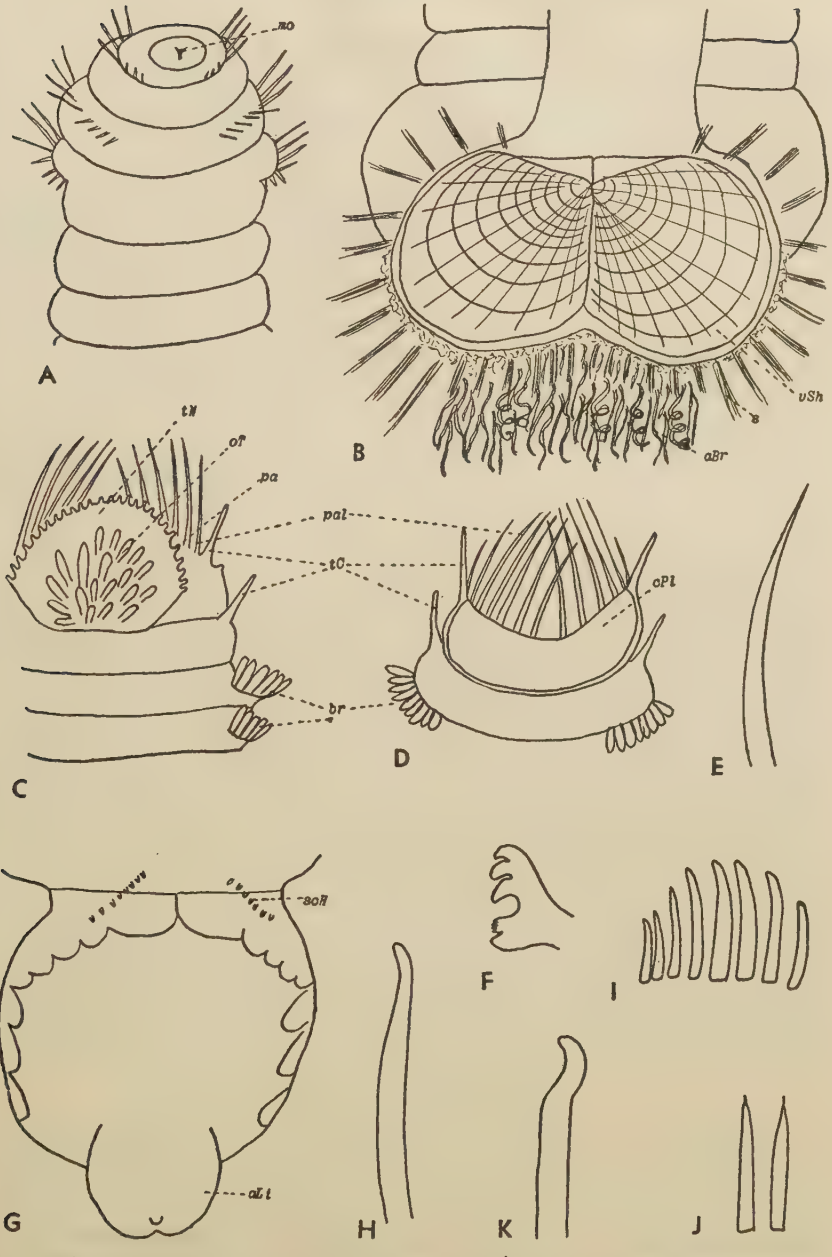


FIGURE 35.—Sternaspidae: *a*, *Sternaspis scutata*, ventral view anterior end; *b*, same, ventral view posterior end. Pectinariidae: *c*, *Pectinaria hyperborea*, ventral view anterior end; *d*, same, dorsal view anterior end; *e*, same, palea; *f*, same, pectiniform uncinus; *g*, same, dorsal view posterior anal plaque or scapha; *h*, same, scaphal seta; *i*, *Pectinaria granulata*, cephalic paleae; *j*, same, cephalic paleae, with short mucronate tips; *k*, same, scaphal hook. (For explanation of symbols, see p. 210.)

Iceland, Faroes; Labrador to Long Island Sound; Bering Sea to western México; north Japan Sea. In low water to 190 fathoms.

***Pectinaria (Cistenides) hyperborea* (Malmgren, 1865)**

FIGURE 35, *c–h*

*Cistenides hyperborea* Malmgren, 1865, p. 360, pl. 18, fig. 40.—Moore, 1903, p. 479.—Fauvel, 1914, p. 277, pl. 26, figs. 27, 28.—Augener, 1928, p. 775.—Berkeley and Berkeley, 1942, p. 201.—Wesenberg-Lund, 1950a, p. 46; 1950b, p. 106; 1951, p. 100.

*Pectinaria (Cistenides) hyperborea* Hessle, 1917, p. 76.—Nilsson, 1928, p. 31, fig. 9.—Gustafson, 1936, p. 8.—Okuda, 1937b, p. 56, fig. 5; pl. 2, fig. F.—Annenkova, 1937, p. 186; 1938, p. 197.—Zatsepin, 1948, p. 147, pl. 37, fig. 4.

*Description.*—Body 28–55 mm. long, 6–12 mm. wide. Tube 45–72 mm. long, 7–10 mm. in greatest diameter, formed of fine sand grains plus some coarser ones. Paleae usually 11–14 pairs (9–15), long, tapered to slender tips. Scaphal hooks taper gradually, without distinct shoulder.

*New records.*—ARCTIC ALASKA: Off Point Barrow base, up to 15 miles from shore, 6–123.5 fms., on bottoms of mud, mass of worm tubes, and various combinations of mud, gravel, stones, rocks, with shells, worm tubes; from fish trap (8 stations, 19 specimens). BERING SEA: *Albatross* Sta. 3610, 55°58′ N., 167°16′ W., 75 fms., mud, 1895. ALASKA: *Albatross* Sta. 4244, Kasaan Bay, Prince of Wales Island, 50–54 fms. WEST GREENLAND: Godhavn, U.S.S. *Alert*, 1884. EAST COAST NORTH AMERICA: Off Labrador, 8–125 fms., *Blue Dolphin* Expeditions, 1949, 1950, 1951; off Nova Scotia, Maine, Massachusetts, 16–65 fms., U. S. Fish Commission.

*Distribution.*—Widely distributed in the Arctic: Siberian and Alaskan Arctic, Greenland, Spitsbergen, Novaya Zemlya, Kara Sea. Also Iceland, Norway to Danish waters, North Sea; Labrador to Massachusetts; Bering Sea to Alaska; north Japan Sea to Japan. In 1.5–379 fathoms.

## Family AMPHARETIDAE

Prostomium (or tentacular membrane) more or less distinctly trilobed, with numerous filiform oral tentacles, smooth or pinnate, retractile in mouth (fig. 36, *a*, *b*, *e*). Branchiae filiform or subulate (rarely pinnate), two to four pairs, inserted on dorsal part of first setigerous segments. First few segments achaetous, with or without special group of setae or paleae anterior to branchiae. Body divided into two distinct regions: (1) thoracic; conical notopodia with smooth, limbate capillary setae and, beginning on setigers 3 or 4, with neuropodial flattened pinnules bearing a row of pectiniform uncini; (2) abdominal; uncinigerous pinnules only. With or without dorsal,

ventral or anal cirri. Tube membranous, covered with mud or agglutinated foreign bodies.

Represented by two genera and four species at Point Barrow. Both genera have prostomia trilobed, without projecting glandular crests; oral tentacles numerous, pinnate; without large dorsal hooks posterior to branchiae; branchiae four pairs, filiform or subulate, arising on or near a distinct transverse dorsal ridge; thoracic setigers 14; uncinigerous pinnules begin on setiger 3; notopodia without claviform cirri.

### Key to the genera of Ampharetidae from Point Barrow

1. With paleae, lateral group of golden setae anterior to branchiae (fig. 36, *a*, *b*)----------**Ampharete** (p. 315)
   Without paleae----------**Asabellides** (p. 318)

## Genus *Ampharete* Malmgren, 1865

All three species have prostomium distinctly trilobed; median lobe with pair of basal eyes, lateral lobes encircling median lobe posteriorly (fig. 36, *a*). First two segments achaetous; first or buccal segment extended anteroventrally forming large lower lip. Segment 3 or paleal segment with group of paleae arranged in semicircle just anterior and lateral to branchiae. Abdominal segments with neuropodial cirri dorsally on uncinigerous pinnules poorly developed (short, rounded to conical) to well developed (cirriform, longer than pinnule).

### Key to the species of Ampharete from Point Barrow

1. First 2 abdominal segments with enlarged, padlike, achaetous notopodial lobes----------**A. vega**
   Without enlarged notopodial lobes on first few abdominal segments-------- 2
2. Paleae slender, taper gradually. Abdominal setigers 12, usually with prominent neuropodial cirri. Anal cirri numerous (fig. 36, *c*)-------**A. acutifrons**
   Paleae taper rather abruptly, with short mucronate tips. Abdominal setigers 16–17, with neuropodial cirri inconspicuous. Anal cirri 2---------- **A. goësi**

### *Ampharete vega* (Wirén, 1883)

FIGURE 36, *a*

*Amphicteis vega* Wirén, 1883, p. 415, pl. 32, figs. 3, 4.
*Ampharete vega* Hessle, 1917, p. 99.—Augener, 1928, p. 778.—Annenkova, 1929, p. 493.—Zatsepin, 1948, p. 150.

*Description.*—Length 16 mm., width 1.5 mm. (up to 50 mm. long, 4 mm. wide—Wirén, 1883). Paleae slender, tapering gradually to fine tips, 10–13 in each group. Eight branchiae form continuous transverse group, arising from low fold. Abdominal segments up to 27–28 (16 in Point Barrow specimen; complete?). First two abdom-

inal segments with enlarged, rounded, padlike, achaetous notopodial lobes. Neuropodial cirri poorly developed or lacking. Pygidium with several small papillae? Colorless in alcohol. Tube thin, membranous, with sand and debris, rather straggly.

*New records.*—Arctic Alaska: West side Elson Lagoon near entrance to small lagoon to west, near Point Barrow (rather brackish water), 1.2 fms. (1 station, 1 specimen).

*Distribution.*—Scattered records in the Arctic: Siberian and Alaskan Arctic, Spitsbergen, Barents Sea, Kara Sea, Laptev Sea. In 1.2–11 fathoms.

### *Ampharete acutifrons* (Grube, 1860)

Figure 36, *b–d*

*Amphicteis acutifrons* Grube, 1860, p. 109, pl. 5, fig. 6.
*Ampharete grubei* Malmgren, 1865, p. 363, pl. 19, fig. 44.—Eliason, 1920, p. 70.—Fauvel, 1927, p. 227, fig. 79, a–p.—Augener, 1928, p. 776.—Thorson, 1946, p. 121, fig. 66.—Hartman, 1948, p. 43.
*Ampharete cirrata* Webster and Benedict, 1887, p. 747, pl. 8, figs. 110–112.
*Ampharete trilobata* Webster and Benedict, 1887, p. 747.
*Ampharete acutifrons* Hessle, 1917, p. 96.—Annenkova, 1937, p. 188; 1938, p. 200.—Zatsepin, 1948, p. 150, pl. 37, fig. 8.—Wesenberg-Lund, 1950a, p. 47; 1950b, p. 109; 1951, p. 102.

*Description.*—Length 45 mm., width 6 mm. (up to 56 mm. long, 8 mm. wide—Wirén, 1883). Paleae slender, taper gradually to long, delicate tips, may be somewhat curved, 10–30 in each group. Branchiae in two groups separated middorsally, each group with three branchiae in transverse line and one slightly more posterior. Abdominal segments 12. With neuropodial cirri small, conical to quite long, longer than pinnule (well developed on Point Barrow specimens). Pygidium a short ring bearing a circle of numerous subequal anal cirri (2 lateral ones may be longer). Colorless in alcohol. Tube membranous, covered with soft, gray debris (or agglutinated mud).

*Remarks.*—The types of *Ampharete cirrata* Webster and Benedict from Eastport, Maine, were examined. This species was separated on the basis of the relative development of the neuropodial cirri, which appears to be somewhat variable. The types of *A. trilobata* Webster and Benedict, also from Eastport, were not available, but this species also, according to the original description, was differentiated by the relative development of the cirri.

*New records.*—Arctic Alaska: Eluitkak Pass, Elson Lagoon near Point Barrow; Point Barrow base, washed ashore; off Point Barrow base, up to 6 miles from shore, 3.7–49 fms., on bottoms of mud, and various combinations of mud, pebbles, gravel, stones, rocks, and

shells (10 stations, 17 specimens). West Coast North America: Washington and Puget Sounds, 80 fms., Pettibone. East Coast North America: Off Labrador, 8 fms., *Blue Dolphin* Expedition, 1949.

*Distribution.*—Widely distributed in the Arctic: Siberian and Alaskan Arctic, Greenland, Jan Mayen, Spitsbergen, Novaya Zemlya. Also Iceland, Swedish west coast to France, Mediterranean; Labrador to Maine; Bering Sea to southern California; north Japan Sea. In 1–1,333 fathoms.

### *Ampharete goësi* Malmgren, 1865

*Ampharete goësi* Malmgren, 1865, p. 364, pl. 19, fig. 45.—Hessle, 1917, p. 91.—Augener, 1928, p. 778.—Annenkova, 1929, p. 492, pl. 38, fig. 37; 1937, p. 188; 1938, p. 200.—Zatsepin, 1948, p. 150, pl. 38, fig. 10.—Wesenberg-Lund, 1950a, p. 47; 1950b, p. 110; 1951, p. 102.—Berkeley and Berkeley, 1952, p. 66, fig. 136.

*Ampharete goësi* subsp. *braznikovi* Annenkova, 1929, p. 492, pl. 38, fig. 44.

*Description.*—Length 35 mm., width 6 mm. (up to 50 mm. long, 7 mm. wide—Malmgren, 1865). Paleae rather stout, taper abruptly, ending in short acuminate tips, 14–21 in each group. Branchiae in two groups separated middorsally, each group with three branchiae in transverse line. Abdominal segments 17 (stem form and Point Barrow specimens) or 16 (subsp. *braznikovi* and Washington Sound specimens). Neuropodial cirri inconspicuous, low, rounded. Pygidium with two long anal cirri. Color: In life: Body reddish orange, branchiae green. In alcohol: Colorless. Tube: Membranous, rather thick, with debris including bits of shells, sea urchins tests, and foraminiferans, very straggly.

*New records.*—Arctic Alaska: Off Point Barrow base, up to 15 miles from shore, 20.3–123.5 fms., on bottoms of mass of worm tubes and various combinations of mud, pebbles, gravel, stones, rocks, shells, and worm tubes (11 stations, 20 specimens). West Coast North America: Washington Sound, Pettibone.

*Distribution.*—Widely distributed in the Arctic: Siberian and Alaskan Arctic, Greenland, Spitsbergen, Barents Sea, White Sea, Novaya Zemlya. Also Iceland; British Columbia to Washington; Okhotsk Sea to north Japan Sea. In 10.5–353 fathoms.

### *Ampharete* sp. (Young)

Two very small specimens, 12 mm. long, were found on bottom of rocks with bryozoans and hydroids in 17 fathoms September 9, 1948. Prostomium 3-lobed, with four eye spots, bases of four pairs branchiae, 14 thoracic segments, 10 abdominal segments plus a growing zone.

### Genus *Asabellides* Annenkova, 1929

Includes *Pseudosabellides* Berkeley and Berkeley, 1943.

#### *Asabellides sibirica* (Wirén, 1883)

FIGURE 36, *e*

*Sabellides sibirica* Wirén, 1883, p. 418.
*Asabellides orientalis* Annenkova, 1929, p. 494, pl. 38, figs. 50, 51, pl. 39, figs. 60–65; 1937, p. 188.
*Asabellides sibirica* Annenkova, 1938, p. 201.
*Pseudosabellides lineata* Berkeley and Berkeley, 1943, p. 131; 1944, p. 3; 1952, p. 71, fig. 147.

*Description.*—Body long, slender, 38 mm. long, 1.5 mm. wide. Prostomium trilobed with median lobe wider and flared anteriorly, lateral lobes diagonal. Segments 1 and 2 fused laterally and ventrally, forming large lower lip; dorsally, appear as two short segments more or less hidden by dorsal branchial fold. Segments 3 and 4 more or less fused ventrally and laterally; dorsally, segment 3 without paleae but with branchiae; segment 4 with first notopodial lobes and, middorsally, a fused nephridial area with pair of papillae posterior to branchial bases. Branchiae slender, filiform, emerge from prominent ridge, six in transverse row, two slightly posterior. Abdominal segments 23 (14–23). Neuropodial cirri small, short, rounded (Point Barrow specimens) to long, slender, cirriform. Pygidium with few small cirri and pair of long lateral ones. COLOR: In life: Salmon below, darker above, branchiae green, oral tentacles pink. In alcohol: Colorless.

*New records.*—ARCTIC ALASKA: Off Point Barrow base, 5 miles from shore, 11.7 fms., on bottom of mud (1 station, 3 specimens).

*Distribution.*—Scattered records in the Arctic: Siberian, Alaskan, and Canadian Arctic. Also Hudson Bay; Bering Sea to British Columbia; Okhotsk Sea to north Japan Sea. In 4–106 fathoms.

## Family TEREBELLIDAE

Body divided into two regions: (1) thoracic; more or less inflated, with dorsal bundles of capillary setae and ventral uncinigerous tori (sometimes acicular crotchets, sometimes absent), often with ventral glandular shields; (2) abdominal; elongated, more or less tapering, most often lacking dorsal setae and bearing only uncinigerous pinnules. Prostomium of variable form and dimensions, fused with buccal segment, forming a lower lip, a transverse dorsal cephalic ridge with or without numerous eye-spots, a tentacular membrane with numerous filiform grooved tentacles not retractile in mouth, a semicircular or folded upper lip (fig. 36, *f*). Branchiae 1–3 pairs, filiform or arborescent, or single, quadrilobed, pectinate, on anterior segments, or

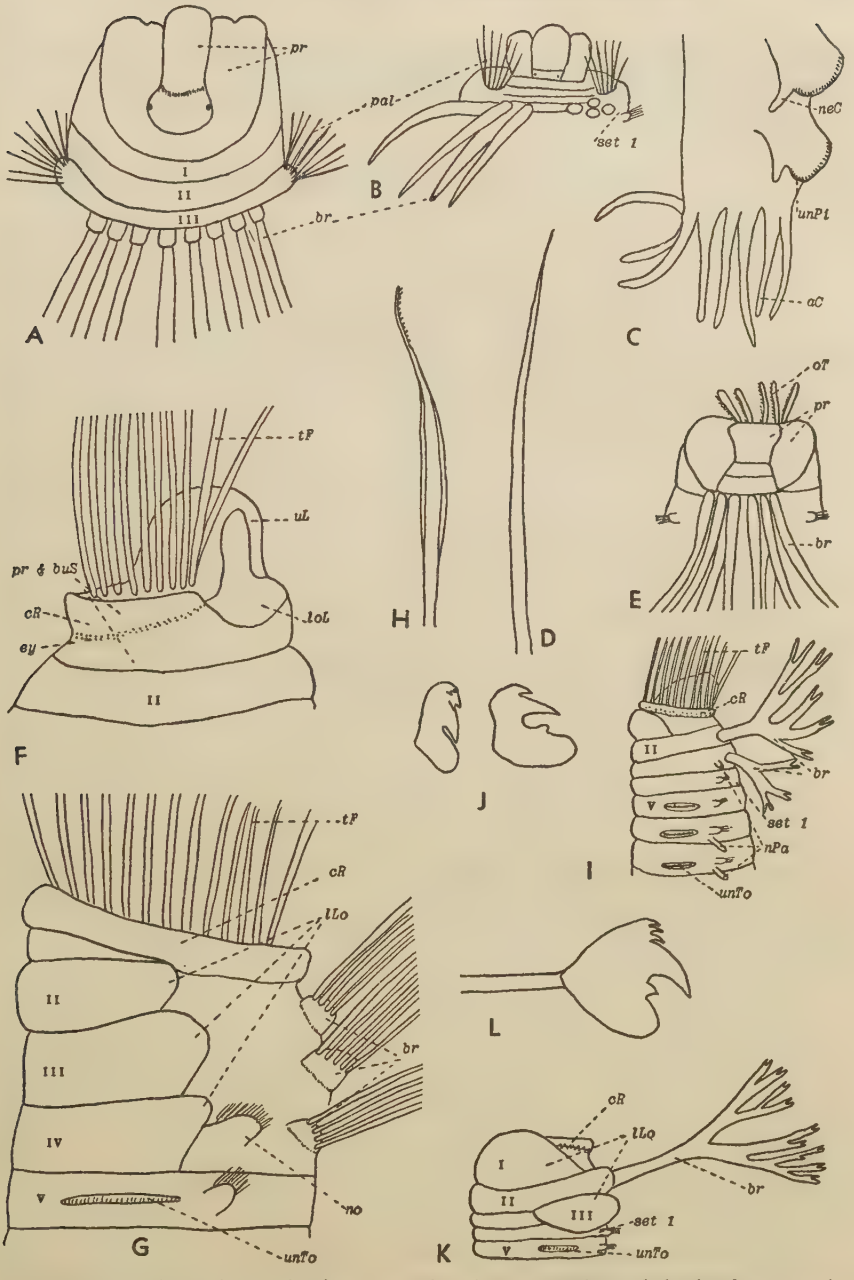


FIGURE 36.—Ampharetidae: *a*, *Ampharete vega*, dorsal view anterior end; *b*, *Ampharete acutifrons*, dorsal view anterior end; *c*, same, lateral view posterior end; *d*, same, palea; *e*, *Asabellides sibirica*, dorsal view anterior end. Terebellidae: *f*, lateral view anterior end of terebellid; *g*, *Amphitrite cirrata*, lateral view anterior end; *h*, same, notoseta; *i*, *Nicolea venustula*, lateral view anterior end of male; *j*, same, thoracic uncini; *k*, *Pista maculata*, lateral view anterior end, tentacles missing; *l*, same, uncinus with long manubrium. (For explanation of symbols, see p. 210.)

branchiae lacking. Without paleae. Tube usually membranous, encrusted with sand, debris of shells, algae, etc.

Represented by 10 genera and 11 species at Point Barrow.

### Key to the genera of Terebellidae from Point Barrow

1. Uncini in single rows on first 6 uncinigerous segments, then in 2 rows (alternating, intercogging or opposite) on certain number of following segments. With distinct thoracic ventral shields (single, not paired). Notosetae begin on segment 4; uncini begin on segments 5 or 6 (setigers 2 or 3). Fused prostomium and buccal segment forming a prominent rectangular lower lip, a transverse semicircular cephalic ridge (with or without numerous eye-spots along basal groove), flared semicircular upper lip, semicircular depressed tentacular region between upper lip and cephalic ridge with numerous, filiform, grooved tentacles (fig. 36, *f*) ..... 2

   Uncini in single rows only (or with crotchets on thoracic segments) ..... 7

2. With 1–3 pairs branchiae dorsally on segments 2–4 (fig. 36, *g*, *i*, *k*). Uncini begin on segment 5 (setiger 2) ..... 3

   Without branchiae. With lateral lobes on anterior segments (fig. 37, *a*) ..... 5

3. Notosetae with tips finely denticled (fig. 36, *h*). Cephalic ridge usually without eye-spots. With lateral lobes on anterior segments (fig. 36, *g*). **Amphitrite** (p. 321)

   Notosetae with tips smooth. Cephalic ridge usually with eye-spots ..... 4

4. Without lateral lobes on anterior segments. Uncini of anterior segments without long manubrium (fig. 36, *j*). Branchiae 2 pairs, branched dichotomously (fig. 36, *i*) ..... **Nicolea** (p. 322)

   With large lateral lobes on buccal segment, enclosing prostomium and connected ventrally (fig. 36, *k*). Uncini of first few segments with long manubrium (fig. 36, *l*). Branchiae 1–3 pairs, arborescent, with main trunk well marked ..... **Pista** (p. 323)

5. Uncini begin on segment 6 (setiger 3). Notosetae of 2 kinds, smooth and denticled ..... **Proclea** (p. 325)

   Uncini begin on segment 5 (setiger 2). Notosetae with tips smooth ..... 6

6. Uncini in single rows on first 6 uncinigerous segments, in double rows on next 10. Nephridial papillae of segment 3 not elongated. Notosetae broadly bilimbate below whiplike tip (fig. 37, *b*) ..... **Leaena** (p. 325)

   Uncini in single rows on first 6 uncinigerous segments, in double rows on next 8. Nephridial papillae of segment 3 (anterior to first setiger) elongated. Notosetae weakly limbate on one side along most of its length (fig. 37, *c*). **Lanassa** (p. 326)

7. Uncini all short, avicular (fig. 37, *d*) ..... 8

   Uncini of 2 types; thoracic aciculiform, with long manubrium (fig. 37, *h*); abdominal avicular (fig. 37, *i*). Without ventral shields ..... 9

8. Branchiae 2–3 pairs, cirriform, in transverse rows. Notosetae begin on segment 3, continuing on large number of segments; uncini begin on segment 5 (setiger 3). Ventral shields usually slightly distinct. Tentacular lobe not especially enlarged ..... **Thelepus** (p. 327)

   Without branchiae. Notosetae begin on segments 2 or 3; uncini begin on variable number of segments, may be absent from thoracic region. With ventral shields, first unpaired, rest paired, more or less separated in median line (fig. 37, *f*). Tentacular membrane large, trilobed or undulating, bearing very numerous tentacles (fig. 37, *e–f*) ..... **Polycirrus** (p. 328)

9. Branchiae 2–3 pairs, single, filiform (fig. 37, *g*). Notosetae and uncini (crotchets) both begin on segment 6. Tentacular lobe folded, with very numerous thin, cylindrical, and short, grooved tentacles.
**Trichobranchus** (p. 329)
Branchiae single, consisting of large cylindrical trunk and 4 pectinate lobes (fig. 37, *j*). Notosetae begin on segment 3, uncini begin on segment 8 (setiger 6). Tentacular lobe large, folded, with numerous tentacles of a single kind----------**Terebellides** (p. 330)

## Genus *Amphitrite* O. F. Müller, 1771

Both species have the body inflated anteriorly, decidedly attenuated posteriorly. Cephalic ridge without eye-spots. Branchiae three pairs, on segments 2–4. Notosetae begin on segment 4; uncini begin on segment 5, in single rows on first six, in double rows on rest of thoracic setigers, in single rows on abdominal segments on projecting pinnules. Pygidium a crenulate ring.

### Key to the species of Amphitrite from Point Barrow

1. Branchiae cirriform, a tuft of simple filaments from short, slightly swollen common base (fig. 36, *g*). Thoracic setigers 17----------**A. cirrata**
Branchiae branched. Thoracic setigers 19----------**A. groenlandica**

### *Amphitrite cirrata* Müller, 1776

FIGURE 36, *g*, *h*

*Amphitrite cirrata* O. F. Müller, 1776, p. 216.—Malmgren, 1865, p. 375, pl. 21, fig. 53.—Webster and Benedict, 1887, p. 748.—Hessle, 1917, p. 185.—Chamberlin, 1920, p. 22.—Eliason, 1920, p. 74.—Fauvel, 1927, p. 251, fig. 86, *i–o*.—Augener, 1928, p. 785.—Okuda, 1938b, p. 102.—Hartman, 1944a, pp. 334, 342; 1948, p. 43.—Thorson, 1946, p. 127, figs. 71, 72.—Gorbunov, 1946, p. 39.—Zatsepin, 1948, p. 156, pl. 38, fig. 12.—Wesenberg-Lund, 1950a, p. 50; 1950b, p. 116; 1951, p. 106.—Berkeley and Berkeley, 1952, p. 86, fig. 175.
*Amphitrite radiata* Moore, 1908, p. 350; 1923, p. 193.

*Description.*—Length up to 200 mm., width 10 mm. About 12 ventral shields. Branchiae 3 pairs, cirriform, a tuft of simple filaments from a short common base. Each of three branchial segments (segments 2–4) with pair of lateral lobes. Nephridial papillae 7 pairs; on segment 3, prominent papillae ventral to second branchial pair; on segments 6–11, rather inconspicuous papillae between notopodia and neuropodia. Thoracic setigers 17. COLOR: In alcohol: Reddish brown. Tube: Mostly of mud, with scattered small pebbles and debris, soft, breaking easily.

*New records.*—ARCTIC ALASKA: Eluitkak Pass, Elson Lagoon; off Point Barrow base, up to 7 miles from shore, 18.3–70 fms., on various combinations of mud, sand, gravel, stones, rocks, large perforated rocks, shells (8 stations, 14 specimens). WEST COAST NORTH

America: Wrangel, Alaska, Jones; Puget Sound, low tide, Pettibone. West Greenland: Vaigat, Disko Island, Bartlett, 1937. East Coast North America: Bay of Fundy, Maine, Massachusetts, 14–110 fms., U. S. Fish Commission.

*Distribution.*—Widely distributed in the Arctic: Siberian, Alaskan, and Canadian Arctic, Greenland, Spitzbergen, Franz Josef Land, White Sea, Novaya Zemlya, Kara Sea. Also Iceland, Faroes, Norway to British Isles, Azores, Mediterranean, Adriatic; Bay of Fundy to Massachusetts; Bering Sea to southern California; Japan. In low water to 1,528 fathoms.

### *Amphitrite groenlandica* Malmgren, 1865

*Amphitrite groenlandica* Malmgren, 1865, p. 376, pl. 21, fig. 52.—Verrill, 1881, pp. 305, 310.—Hessle, 1917, p. 181.—Fauvel, 1927, p. 250, fig. 86, a–c.—Augener, 1928, p. 787.—Annenkova, 1937, p. 192; 1938, p. 206.—Gorbunov, 1946, p. 39.—Zatsepin, 1948, p. 157, pl. 38, fig. 14.—Wesenberg-Lund, 1950a, p. 51; 1950b, p. 117; 1951, p. 107.

*Neoamphitrite robusta* Hartman, 1948, p. 44 (not *Amphitrite robusta* Johnson, 1901).

*Description.*—Length up to 190 mm., width 9 mm. (a single, much smaller specimen from Point Barrow). About 14 ventral shields. Branchiae 3 pairs, branched dichotomously 3–4 times, with main trunk short, thick. Lateral lobes of first two branchial segments well developed, continuing ventrally; small lateral lobes on third branchial segment. Nephridial papillae 12 pairs on segments 3–14, the first four with more prominent papillae. Thoracic setigers 19. Colorless in alcohol. Tube of mud.

*Remarks.*—*A. robusta* Johnson is very close to *A. groenlandica;* it differs in having 17 thoracic setigers instead of 19.

*New records.*—Arctic Alaska: Off Point Barrow base, 5 miles from shore, 49 fms., on bottom of rocks, stones, gravel (1 station, 1 specimen). Southwestern Alaska: Round Island, Coal Harbor, Unga Island, 8–9 fms., Dall, 1872.

*Distribution.*—Scattered records in the Arctic: Siberian and Alaskan Arctic, West Greenland, Spitsbergen, Novaya Zemlya. Also Iceland, Scandinavian coast to North Sea, Ireland; Maine; southwestern Alaska; Okhotsk Sea to north Japan Sea. In 7 to 440 fathoms.

## Genus *Nicolea* Malmgren, 1865

### *Nicolea venustula* (Montagu, 1818)

Figure 36, *i, j*

*Terebella venustula* Montagu, 1818, p. 344, pl. 13, fig. 2.

*Nicolea arctica* Malmgren, 1865, p. 381, pl. 24, figs. 66, 67.

*Nicolea zostericola* Malmgren, 1865, p. 381, pl. 26, fig. 76.—Webster and Benedict, 1887, p. 749.—Moore, 1909b, p. 141.—Fauvel, 1927, p. 261, fig. 90, g–n.—Annenkova, 1934, p. 322; 1937, p. 191; 1938, p. 205.—Gustafson, 1936, p.

9.—Berkeley and Berkeley, 1943, p. 130; 1952, p. 87, figs. 177, 178.—Gorbunov, 1946, p. 39.—Hartman, 1948, p. 44.

*Nicolea simplex* Verrill, 1873, p. 613; 1881, p. 302, pl. 10, fig. 1.—Sumner, Osburn, and Cole, 1913, p. 627.

*Nicolea venustula* Ehlers, 1913, p. 559.—Hessle, 1917, p. 171.—Chamberlin, 1920, p. 22.—Eliason, 1920, p. 73.—Fauvel, 1927, p. 260, fig. 90, a–f; 1934a, p. 68.—Augener, 1928, p. 788.—Thorson, 1946, p. 126.—Zatsepin, 1948, p. 156, pl. 38, fig. 11.—Wesenberg-Lund, 1950a, p. 51; 1950b, p. 118; 1951, p. 109.

*Description.*—Length 15–48 mm., width 2–5 mm., segments 30–46 (up to 70 mm. long—Wirén, 1883). Ventral shields about 14. Cephalic ridge with numerous dark eye-spots. Branchiae two pairs, on segments 2–3, branched dichotomously 3–6 times, with very short main stem, first pair much larger than second. Without lateral lobes on branchial segments. Nephridial papillae on segments 3 (slightly posterior to pair of second branchiae), 6, and 7; small in female; in male, papillae on segments 6 and 7 long, cylindrical. Thoracic setigers 15 (14–18, according to Hessle). Uncini begin on segment 5 (setigerous segment 2), in single rows on first six, in two alternating rows on rest of thoracic segments, in single rows on prominent projecting abdominal pinnules. Pygidium crenulate. Colorless or slightly brownish in alcohol. Females with large yolky eggs inside body (Point Barrow, August 21, and September 15, 1948; August 8, 1949). Tube with tough, translucent membranous lining, with small pebbles of various sizes, shell debris, foraminiferans, etc.

*New records.*—Arctic Alaska: Off Point Barrow base, up to 12.1 miles from shore, 13.3–123.5 fms., on bottoms of mud, stones, mass of worm tubes, and various combinations of mud, sand, gravel, pebbles, stones, rocks, large perforated rocks, with bryozoans, hydroids, shells (24 stations, 79 specimens). Alaska: Security Bay, Jones. Canadian Arctic: Dobbin Bay, E. Ellesmere Island, 79°36′ N., 73°35′ W., 17 fms., Littlewood, 1950. East Coast North America: Off Maine, Massachusetts, Rhode Island, Connecticut, shore to 63 fathoms and surface (young), U. S. Fish Commission.

*Distribution.*—Widely distributed in the Arctic: Siberian, Alaskan, and Canadian Arctic, Greenland, Jan Mayen, Spitsbergen, Franz Josef Land, Novaya Zemlya, Kara Sea. Also Iceland, Faroes, Norway to France, Mediterranean, Adriatic, Red Sea; Hudson Bay to Connecticut; Bering Sea to western Canada; north Japan Sea; South Africa. In low water to 472 fathoms.

### Genus *Pista* Malmgren, 1865

#### *Pista maculata* (Dalyell, 1853)

Figure 36, *k*, *l*

*Terebella maculata* Dalyell, 1853, p. 203, pl. 28, figs. 10–14, 19.

*Scione lobata* Malmgren, 1865, p. 383, pl. 23, fig. 62.—Verrill, 1881, pp. 305, 310.—Webster and Benedict, 1887, p. 749.—Augener, 1928, p. 789.—Friedrich, 1939, p. 127.

*Pista maculata* Hessle, 1917, p. 161, pl. 3, fig. 4.—Fauvel, 1927, p. 263, fig. 91, a–h.—Berkeley and Berkeley, 1943, p. 130.—Gorbunov, 1946, p. 39.—Zatsepin, 1948, p. 155, pl. 38, fig. 9.—Wesenberg-Lund, 1950a, p. 52; 1950b, p. 119; 1951, p. 110.

*Pista groenlandica* Treadwell, 1937, p. 33, figs. 14–16.

*Description.*—Length up to 150 mm., width 6 mm. Ventral shields about 14. Cephalic ridge with numerous eye-spots. Single pair large branchiae on segment 2, with large, cylindrical main trunk, branched. Buccal segment with two large, rounded lateral lobes embracing prostomium, connected ventrally by a crest; segment 2 short, without lateral lobes; segment 3 with large, rounded, flattened lateral lobes. Nephridial papillae on segments 6–7. Thoracic setigers 16 (one had small lobe on one side only on 17). Uncini begin on segment 5 (setiger 2), in single rows on first 6, in two alternating intercogging rows on rest of thoracic segments, in single rows on rectangular pinnules in abdominal region. Pygidium with six or seven (6–12) conical papillae, arranged starlike. Color: In alcohol: Branchiae and tentacles dark brown or colorless. Tubes: Irregularly twisted, with thin transparent membranous lining covered mostly with fine sand grains plus few large pebbles, bits of shell, bryozoans, foraminiferans, algae, parts of other worm tubes.

*Remarks.*—The type of *P. groenlandica* Treadwell from Baffin Bay was examined and is herein referred to *P. maculata*. Contrary to the original description, eye-spots are present on the cephalic ridge (small, in transverse groove, easily overlooked).

*New records.*—Arctic Alaska: Off Point Barrow base, up to 15 miles from shore, 21–123.5 fms., on bottoms of mass of worm tubes and various combinations of mud, gravel, stones, rocks, large perforated rocks; from crab, *Hyas coarctatus* (13 stations, 168 plus specimens). North Greenland: 5 miles south Cape Chalon; north Omenolu near North Star Bay, 17 fms., Bartlett, 1932. West Greenland: Oelrichs Bay, 1937; off Conical Rock, 76°3′ N., 67°30′ W., 20–40 fms., 1938; 1 mile northwest Conical Rock, 25–60 fms., 1940; between north shores Parkers Snow Bay and Conical Rock, 25–45 fms., 1940; all collected by Bartlett. East Greenland: Off Cape Hold with Hope, 23–40 fms., Bartlett, 1939. East Coast North America: Off Labrador, 8–125 fms., *Blue Dolphin* Expeditions, 1949, 1950, 1951.

*Distribution.*—Widely distributed in the Arctic: Siberian, Alaskan, and Canadian Arctic, Baffin Bay, Greenland, Spitsbergen, Barent Sea, Novaya Zemlya. Also Iceland, Norway to English Channel: Hudson Bay to Maine; Bering Sea. In 3–1,528 fathoms.

## Genus *Proclea* Saint-Joseph, 1894

### *Proclea graffii* (Langerhans, 1884)

*Leaena graffii* Langerhans, 1884, p. 262, pl. 15, fig. 21.
*Proclea graffi* Southern, 1914, p. 120.—Hessle, 1917, p. 199, fig. 53.— Fauvel, 1927, p. 268, fig. 94, a–g.—Gorbunov, 1946, p. 39.—Zatsepin, 1948, p. 157, pl. 38, fig. 19.—Wesenberg-Lund, 1951, p. 111.

*Description.*—Length up to 42 mm., width 3 mm., segments 49. Ventral shields about 10. Cephalic ridge without eye-spots. Without branchiae. With lateral lobes on segments 2–4, those on segments 2 and 3 elongate, extending to ventral shields. Nephridial papillae on segments 3, 6–8. Thoracic setigers 16. Uncini begin on segment 6 (setiger 3), in single rows on first six, in double rows on rest of thoracic segments, in single rows on projecting abdominal pinnules. Pygidium crenulate. Colorless in alcohol. Tube?

*New records.*—Arctic Alaska: Off Point Barrow base, up to 7.5 miles from shore, 21–36 fms., on bottoms of rocks, stones, large perforated rocks, from breaking rocks apart (3 stations, 6 specimens).

*Distribution.*—Scattered records in the Arctic: Siberian and Alaskan Arctic, Franz Josef Land, White Sea. Also Bering Sea to Okhotsk Sea; Iceland, Swedish west coast, Finland, Ireland, Madeira. In 1–36 fathoms.

## Genus *Leaena* Malmgren, 1865

### *Leaena abranchiata* Malmgren, 1865

Figure 37, *a, b*

*Leaena abranchiata* Malmgren, 1865, p. 385, pl. 24, fig. 64.—not Moore, 1909b, p. 141 (=*Lanassa venusta*).—Ehlers, 1913, p. 563.—Hessle, 1917, p. 197.—Augener, 1928, p. 793.—Annenkova, 1937, p. 192; 1938, p. 208.—Berkeley and Berkeley, 1943, p. 130.—Gorbunov, 1946, p. 39.—Zatsepin, 1948, p. 157, pl. 38, fig. 17.—Hartman, 1948, p. 45.—Wesenberg-Lund, 1950a, p. 53; 1950b, p. 121; 1951, p. 112.
*Leaena antarctica* McIntosh, 1885, p. 462, pl. 48, figs. 9, 10; pl. 28A, figs. 10, 11.
*Leaena abranchiata* var. *antarctica* Hessle, 1917, p. 197.—Monro, 1930, p. 188; 1936, p. 178.

*Description.*—Length 43 mm., width 3 mm. (up to 75 mm. long, 6 mm. wide—Malmgren, 1865). About 10 ventral shields. Cephalic ridge without eye-spots. Without branchiae. Lateral lobes on segment 2 extend ventrally, those on segment 3 extend dorsally, forming a prominent ridge (segment preceding first setiger; ridge not so prominent in var. *antarctica*). Thoracic setigers 10. Uncini begin on segment 5 (setiger 2), in single rows on first 6, in double rows on next 10, then in single rows on prominent abdominal pinnules. Notosetae widely bilimbate below whiplike tips. Colorless in alcohol. Tube: Of soft mud with a few bits of scattered rock (some small ones on tubes of *Pista maculata*).

*New records.*—Arctic Alaska: Off Point Barrow base, 25 fms., on bottoms of gravel, stones, shells (1 station, 1 specimen). East Coast North America: Off Labrador, 15–55 fms., mud and mud with rock, *Blue Dolphin* Expeditions, 1950, 1951.

*Distribution.*—Widely distributed in the Arctic: Siberian and Alaskan Arctic, Baffin Bay, Greenland, Spitsbergen, Novaya Zemlya, Kara Sea. Also Iceland, Faroes, Norway, Sweden, Finland; Hudson Bay to Labrador; southwestern Alaska; Okhotsk Sea to north Japan Sea. In 6–833 fathoms. Var. *antarctica*: Antarctic, South Georgia; up to 1,975 fathoms.

## Genus *Lanassa* Malmgren, 1865

### *Lanassa venusta* (Malm, 1874)

Figure 37, *c*

*Laphaniella venusta* Malm, 1874, p. 98, pl. 1, fig. 8.
*Leaena nuda* Moore, 1905b, p. 855, pl. 44, figs. 14, 15.
*Leaena abranchiata* Moore, 1909b, p. 141 (not *L. abranchiata* Malmgren, 1865).
*Lanassa venusta* Hessle, 1917, p. 205.—Eliason, 1920, p. 75.—Gustafson, 1936, p. 9.—Annenkova, 1937, p. 194; 1938, p. 209.—Zatsepin, 1948, p. 157.
*Lanassa venusta* subsp. *pacifica* Annenkova, 1938, pp. 209, 230.

*Description.*—Length 37–55 mm., width 3 mm., segments 54–67. Ventral shields about 10. Cephalic ridge without eye-spots (present in subsp. *pacifica*). Oral tentacles numerous (more than 12 as indicated by Malm). Without branchiae. Lateral lobes on segments 2 and 3 extending ventrally; small lateral lobes on segment 4. Nephridial papillae on segments 3, 6–8; those of segment 3 prominent (anterior to first setiger). Thoracic setigers 11 (12 on subsp. *pacifica*). Uncini begin on segment 5 (setiger 2), single on first six, in double rows on next eight, in single rows on prominent abdominal pinnules. Notosetae weakly limbate (fig. 37, *c*). Pygidium crenulate. Females with large yolky eggs in body (Point Barrow, Sept. 9 and 15, 1948; Aug. 17, Oct. 11, 1949; Aug. 1, 1950). Color: In life: Orange, with white shields, tentacles tan. In alcohol: Colorless. Tube: With thin, transparent membranous lining, with very loose mud, bits of sand, rock, foraminiferans (tube of specimen from Labrador with great deal of loosely assembled shell debris).

*Remarks.*—The type of *Leaena nuda* Moore from southwestern Alaska was examined and found in poor condition. It has been referred previously to *Lanassa venusta* by Annenkova (1937).

*New records.*—Arctic Alaska: Point Barrow base, washed ashore; off Point Barrow base, up to 12.1 miles from shore, 18.3–75.5 fms., on bottoms of mud, stones, and various combinations of mud, sand, gravel, pebbles, stones, rocks, large perforated rocks, with bryozoans, shells (17 stations, 44 specimens). Canadian Arctic: Cove in

Kneeland Bay, Frobisher Bay, Baffin Island, 14 fms., Bartlett, 1942.

*Distribution.*—Scattered records in the Arctic: Siberian, Alaskan, and Canadian Arctic. Also Swedish west coast, Danish waters; Labrador; southwestern Alaska; north Japan Sea. In 7–140.5 fathoms.

### Genus *Thelepus* Leuckart, 1849

#### *Thelepus cincinnatus* (Fabricius, 1780)

FIGURE 37, *d*

*Amphitrite cincinnata* Fabricius, 1780, p. 286.

*Thelepus circinnata* Malmgren, 1865, p. 387, pl. 22, fig. 58.

*Thelepus cincinnatus* Webster and Benedict, 1887, p. 749.—Hessle, 1917, p. 212.—Chamberlin, 1920, p. 23.—Eliason, 1920, p. 76.—Fauvel, 1927, p. 271, fig. 95, i–m; 1932, p. 233, fig. 40; 1934a, p. 69.—Augener, 1928, p. 790.—Monro, 1930, p. 192; 1936, p. 182.—Treadwell, 1937, p. 33.—Friedrich, 1939, p. 127.—Hartman, 1944a, pp. 336, 343; 1952, p. 236.—Gorbunov, 1946, p. 39.—Zatsepin, 1948, p. 154, pl. 38, fig. 7.—Wesenberg-Lund, 1950a, p. 54; 1950b, p. 122; 1951, p. 112.

*Thelepus hamatus* Moore, 1905b, p. 856, pl. 44, figs. 16–18.—Hartman, 1948, p. 44.—Berkeley and Berkeley, 1952, p. 82, fig. 167.

*Description.*—Up to 200 mm. long, 10 mm. wide, segments numerous. Dorsal surface rugose, with small glandular warts irregularly distributed and especially abundant anteriorly. Ventral shields indistinct, wide, somewhat wrinkled. Buccal segment and prostomium forming a thick lower lip, a prominent horseshoe-shaped upper lip, a semicircular cephalic ridge with numerous small eye-spots; tentacular area between upper lip and cephalic ridge with numerous, rather thick tentacles. Branchiae 2 pairs on segments 2 and 3, each formed of numerous, simple filaments arranged in parallel transverse rows. Nephridial papillae on segments 4–7. Notosetae begin on segment 3, continuing on about 40 segments (or almost to posterior end). Uncini begin on segment 5 (setiger 3), in single rows throughout, the uncinigerous tori gradually transformed into projecting rectangular pinnules. Pygidium with crenulate anal opening. COLOR: In life: Orange with red branchiae, tan tentacles, with whitish glandular areas ventrally and laterally. In alcohol: Colorless. TUBE: Cylindrical, twisted, with tough, transparent, membranous lining, covered with small pebbles of varying sizes, with fragments of shells, bryozoans, foraminiferans, old worm tubes, algae.

*Remarks.*—The type of *T. hamatus* Moore from Alaska was examined and is herein referred to *T. cincinnatus*; it is a small specimen, consisting of anterior end only.

*New records.*—ARCTIC ALASKA: Off Point Barrow base, up to 15 miles from shore, 20–123.5 fms., on bottoms of mass of worm tubes, rocks, stones, gravel, attached to stems of *Tubularia* (6 stations, 7 specimens). WEST GREENLAND: Godhavn, off Hare Island, 70°20′

N., 56° W., 90 fms., Greely Relief Expedition, 1884. One mile northwest Conical Rock, 25–60 fms., and north shore Wolstenholm, 13–25 fms., Bartlett, 1940. East Greenland: Off Cape Hold with Hope, 23–40 fms., Bartlett, 1939. East Coast North America: Off Labrador, 12–30 fms., *Blue Dolphin* Expedition, 1949; off New Brunswick, Nova Scotia, Maine, New Hampshire, Massachusetts, 16–640 fms., U. S. Fish Commission. West Coast North America: Washington and Puget Sounds, low water to 46 fms., mud, shell, rock, Pettibone.

*Distribution.*—Widely distributed in the Arctic: Siberian, Alaskan, and Canadian Arctic, Greenland, Jan Mayen, Spitsbergen, Franz Josef Land, Barents Sea, Novaya Zemlya. Also Iceland, Faroes, Shetlands, Norway to Portugal, Azores, Madeira, Mediterranean, Adriatic; Labrador to Massachusetts; Bering Sea to Washington; Japan; Indian Ocean (Andamans). Southern latitudes: South Georgia, South Orkneys, South Shetlands, Graham Coast, Palmer Peninsula. In low water to 1,391 fathoms.

## Genus *Polycirrus* Grube, 1851

### *Polycirrus medusa* Grube, 1855

Figure 37, *e, f*

*Polycirrus medusa* Grube, 1855, p. 120.—Hessle, 1917, p. 220.—Fauvel, 1927, p. 279, fig. 97, a–d.—Augener, 1928, p. 795.—Annenkova, 1934, p. 322; 1937, p. 194; 1938, p. 210.—Gorbunov, 1946, p. 39.—Zatsepin, 1948, p. 154, pl. 38, fig. 5.—Wesenberg-Lund, 1950a, p. 54; 1950b, p. 123; 1951, p. 114.

*Ereutho smitti* Malmgren, 1865, p. 391, pl. 23, fig. 63.—Webster and Benedict, 1887, p. 749.

*Polycirrus* sp., Hartman, 1948, p. 45.

*Description.*—Length up to 70 mm., width 6 mm. Integument tesselated. Large unpaired ventral shield on first few segments, followed by about six pairs of ventral shields separated in midline. Prostomium and buccal segment forming lower lip, wide semicircular dorsal cephalic ridge (without eye-spots), large trilobed or undulating tentacular membrane with very numerous tentacles on its outer edge, the inner part forming folded upper lip; some tentacles long, slender, filiform, others thicker, distinctly grooved. Thoracic setigers usually 13 (10–13), beginning on segment 3 (or 2). Without thoracic uncini; uncini begin on segment 16 (or 15 or just posterior to last setiger), uniserial, few in number, very small and inconspicuous, on slightly raised abdominal pinnules. Six pairs nephridial papillae on segments 3–8. Females with large, yolky eggs (Point Barrow, September 15, 1948, and October 14, 1949). Color: In life: Red. In alcohol: Colorless. Tube: Simple galleries in mud or sand.

*New records.*—Arctic Alaska: Off Point Barrow base, up to 15 miles from shore, 13.3–78.2 fms., on bottoms of mud and various com-

binations of mud, pebbles, gravel, stones, rocks, large perforated rocks, with bryozoans, worm tubes (13 stations, 35 specimens). Spitsbergen: Spitsbergen Sea, U. S. S. *Alliance*, 1881. Northwest Greenland: One mile northwest Conical Rock, 25–60 fms., Bartlett, 1940. Bering Sea: St. Paul Island, Pribilofs, Palmer, 1890. East Coast North America: Off Labrador, 45 fms., silt, *Blue Dolphin* Expedition, 1949. West Coast North America: Pavlof Bay, Alaska, 150 fms., Alaska King Crab Investigation, 1940; Washington Sound, 12–46 fms., mud and mussels, Pettibone.

*Distribution.*—Widely distributed in the Arctic: Siberian and Alaskan Arctic, Greenland, Spitsbergen, White Sea, Novaya Zemlya, Kara Sea. Also Iceland, Faroes, Swedish west coast to France, Mediterranean; Labrador to Maine; Bering Sea to Washington; Okhotsk Sea to north Japan Sea. In low water to 889 fathoms.

### Genus *Trichobranchus* Malmgren, 1865

#### *Trichobranchus glacialis* Malmgren, 1865

Figure 37, *g–i*

*Trichobranchus glacialis* Malmgren, 1865, p. 395, pl. 24, fig. 65.—Webster and Benedict, 1887, p. 750.—Ehlers, 1913, p. 566.—Hessle, 1917, p. 131.—Fauvel, 1927, p. 288, fig.100,a–h.—Augener, 1928, p. 792.—Annenkova, 1937, p. 190; 1938, p. 202.—Zatsepin, 1948, p. 153, pl. 38, fig. 1.—Wesenberg-Lund, 1950a, p. 55; 1950b, p. 125; 1951, p. 115.—Berkeley and Berkeley, 1952, p. 76, figs. 154, 155.

*Trichobranchus glacialis* var. *antarcticus* Hessle, 1917, p. 132.—Hartman, 1952, p. 233.

*Description.*—Length up to 30 mm., width 3 mm., segments 60–70. Buccal segment and prostomium form thick, tesselated, inflated lower lip connected laterally with pair of projecting, rounded, flattened lobes (ventral to mass of tentacles), cephalic ridge with numerous black eyespots (absent in var. *antarcticus*), undulating tentacular membrane with very numerous tentacles, and folded upper lip; some tentacles larger, distinctly grooved; others smaller, filiform. Three pairs branchiae on segments 2–4, each composed of single long filament. With slightly projecting lateral lobes on branchial segments. Thoracic setigers and uncinigers 15, beginning on segment 6; notosetae limbate, with smooth capillary tips; neuropodial uncini aciculiform (crotchets). Abdominal segments with avicular uncini in single rows on triangular projecting pinnules. Pygidium with anal opening crenulate. Colorless in alcohol. Tube membranous, encrusted with mud or fine sand.

*New records.*—Arctic Alaska: Off Point Barrow base, up to 5 miles from shore, 27–49 fms., on various combinations of mud, gravel, stones, rocks, shells (5 stations, 15 specimens). East Coast North America: Cape Cod Bay, Massachusetts, 27–118 fms., U. S. Fish Commission.

*Distribution.*—Widely distributed in the Arctic: Alaskan Arctic, Greenland, Spitsbergen, Novaya Zemlya, Kara Sea. Also Iceland, Faroes, Swedish west coast to Spain, Canary Islands, Mediterranean; Maine to Massachusetts; British Columbia; north Japan Sea. Var. *antarcticus:* Magellan Straits, South Georgia, Ross Island, Kaiser Wilhelm II Land. In 3–1,517 fathoms.

## Genus *Terebellides* M. Sars, 1835

### *Terebellides stroemii* M. Sars, 1835

FIGURE 37, *j–m*

*Terebellides stroemii* M. Sars, 1835, p. 48, pl. 13, fig. 31.—Malmgren, 1865, p. 396, pl. 20, fig. 48.—Webster and Benedict, 1887, p. 750.—Moore, 1903, p. 478; 1908, p. 352; 1923, p. 199.—Hessle, 1917, p. 137.—Chamberlin, 1920, p. 23.—Eliason, 1920, p. 72.—Fauvel, 1927, p. 291, fig. 100, i–q; 1932, p. 234; 1947, p. 79, fig. 76, f–i.—Augener, 1928, p. 797.—Gustafson, 1936, p. 9.—Annenkova, 1937, p. 190; 1938, p. 202.—Treadwell, 1937, p. 35.—Okuda, 1938b, p. 102.—Friedrich, 1939, p. 127.—Berkeley and Berkeley, 1943, p. 130; 1944, p. 5; 1952, p. 75, figs. 152, 153.—Hartman, 1944a, pp. 336, 343; 1944d, p. 24; 1951, p. 113.—Thorson, 1946, p. 124, fig. 69.—Gorbunov, 1946, p. 39.—Zatsepin, 1948, p. 153, pl. 38, fig. 3.—Støp-Bowitz, 1948c, p. 68.—Wesenberg-Lund, 1949, p. 355; 1950a, p. 55; 1950b, p. 126; 1951, p. 115, fig. 11.—Hartman and Reish, 1950, p. 44.

*Terebellides stroemii* var. *japonica* Moore, 1903, p. 478; 1908, p. 352; 1923, p. 200.

*Description.*—Length up to 75 mm., width 8 mm., segments 50–60. Prostomium and buccal segment forming large, transverse, crescent-shaped plate below mouth, large and undulating tentacular membrane with numerous, short, grooved tentacles, folded upper lip; dorsally without cephalic ridge or eye-spots. Segment 2 short, achaetous. Single branchia formed of large cylindrical trunk dorsally on segment 3 (first setiger) and four pectinate lobes, frequently interlocked giving appearance of more or less solid mass. With somewhat developed lateral lobes extending ventrally on segments 2–7 (larger on segments 3–6). Thoracic setigers 18, begin on segment 3. Uncini begin on segment 8 (setiger 6), those on first unciniger consisting of crotchets with long manubrium and bent, pointed tips, those on rest of thoracic segments long, aciculiform, with large fang and few denticles; may be crowded in more than one row in large specimens. Abdominal uncini short, avicular, pectiniform, in single rows on projecting triangular pinnules. Prominent paired nephridial papillae on segment 3, smaller ones on segments 6 and 7. Pygidium with terminal anus, with sides crenulate. Female with large yolky eggs (ripe eggs and sperm, September 26, 1949). COLOR: In life: Body orange, branchia orange-red, tentacles tan. In alcohol: Colorless, with smooth iridescent surface.

*Parasites.*—One of the 87 specimens had the parasitic copepod *Saccopsis terebellidis* Levinsen (identified by P. L. Illg) attached to

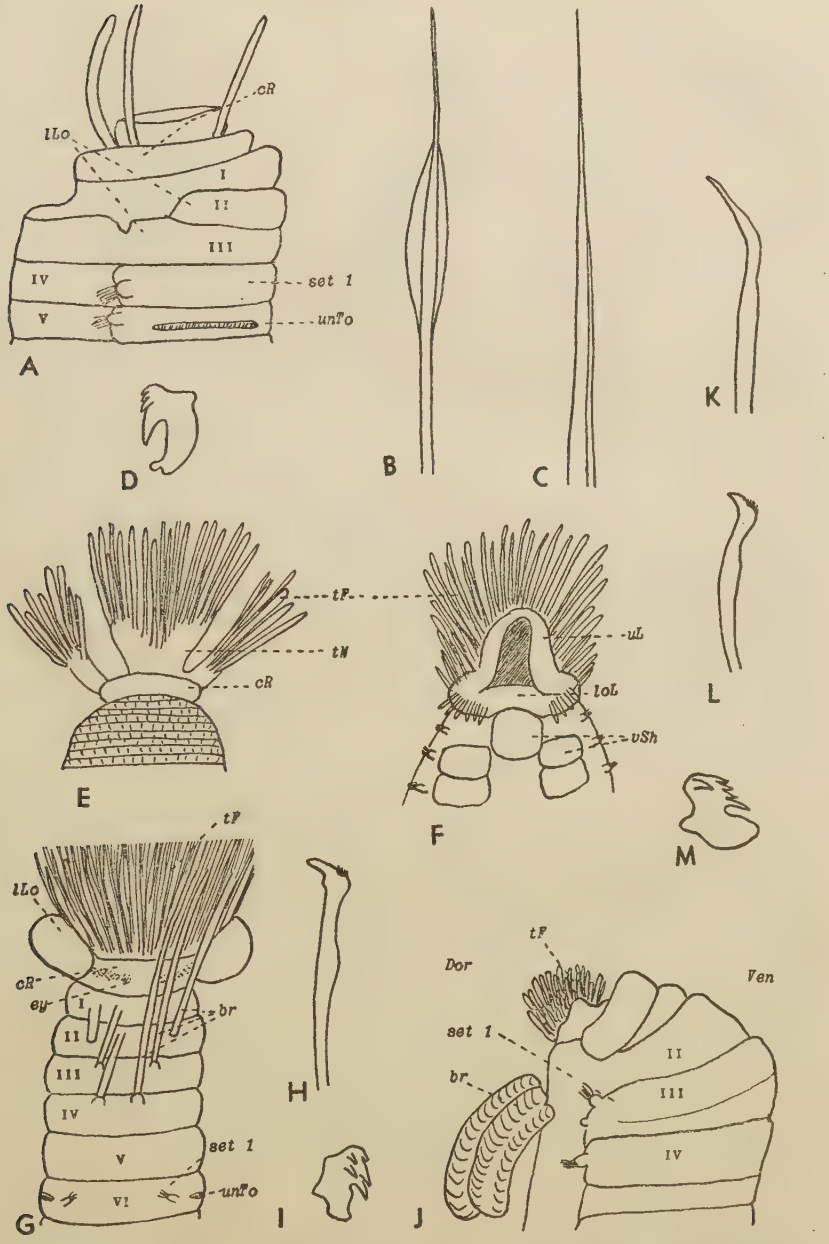


FIGURE 37.—Terebellidae: *a*, *Leaena abranchiata*, lateral view anterior end; *b*, same, notoseta; *c*, *Lanassa venusta*, notoseta; *d*, *Thelepus cincinnatus*, avicular uncinus; *e*, *Polycirrus medusa*, dorsal view anterior end; *f*, same, ventral view anterior end; *g*, *Trichobranchus glacialis*, dorsal view anterior end; *h*, same, thoracic aciculiform uncinus; *i*, same, abdominal avicular uncinus; *j*, *Terebellides stroemii*, lateral view anterior end; *k*, same, crotchet from first unciniger; *l*, same, thoracic aciculiform uncinus; *m*, same, abdominal avicular uncinus. (For explanation of symbols, see p. 210.)

261112—54——9

anterior part in the region of the branchia. The same polychaete and copepod species were found in Iceland waters and figured by Wesenberg-Lund (1951, p. 117, fig. 11).

*New records.*—Arctic Alaska: West side Elson Lagoon near Point Barrow, 1.2 fms.; Eluitkak Pass, Elson Lagoon; Point Barrow base, washed ashore; off Point Barrow base, up to 15 miles from shore, 18.3–123.5 fms., on bottoms of mud, stones, mass of worm tubes, and various combinations of mud, sand, pebbles, gravel, stones, rocks, large perforated rocks, with shells, bryozoans, worm tubes (26 stations, 87 specimens). West Coast North America: Washington and Puget Sounds, 10–165 fms., Pettibone. East Coast North America: Off Labrador, 5–65 fms., *Blue Dolphin* Expeditions, 1949, 1950; off Nova Scotia, Maine, Massachusetts, Rhode Island, Long Island Sound, 6–368 fms., U. S. Fish Commission.

*Distribution.*—Widely distributed in the Arctic: Siberian, Alaskan, and Canadian Arctic, Greenland, Jan Mayen, Spitsbergen, Franz Josef Land, Barents Sea, White Sea, Novaya Zemlya, Kara Sea. Also Iceland, Faroes, Norway to Portugal, Mediterranean, Adriatic, Black Sea; Hudson Bay to Long Island Sound, Gulf of Mexico, West Indies; Bering Sea to southern California, Panamá, Venezuela; north Japan Sea to Japan; Iranian Gulf; Indian Ocean; South Africa, Bouvet Island, Kerguelen, New Caledonia. In low water to 1,611 fathoms.

## Family Sabellidae

Body cylindrical, tapered posteriorly. Prostomium indistinct. Buccal region with mouth terminal, with dorsal lip, two ventral lips or vesicular bulbs, two fleshy, membranous or filiform palps of variable length. Branchiae form conspicuous, often highly colored terminal funnellike plume surrounding mouth; plume formed of two semicircular or spiral lobes bearing numerous filaments each with two rows of ciliated barbules (fig. 38, *a*). Branchiae without operculum. A collarette more or less developed on first segment. Body divided into two regions: (1) thoracic; few segments (4–12), with dorsal bundles of capillary setae and ventral uncinigerous tori (tori lacking in *Myxicola*); without thoracic membrane; (2) abdominal; with inversion

---

Figure 38.—Sabellidae: *a*, *Sabella crassicornis*, lateral view anterior end; *b*, same, tip of branchial filament; *c*, same, thoracic notosetae; *d*, same, dorsal view pygidium; *e*, same, thoracic hoe-like seta from ventral torus; *f*, same, thoracic avicular uncinus from ventral torus; *g*, same, ventral view collarette; *h*, same, lateral view; *i*, same, dorsal view; *j*, *Potamilla neglecta*, dorsal view collarette; *k*, same, lateral view; *l*, same, ventral view; *m*, same, dorsal thoracic limbate seta; *n*, same, dorsal thoracic spatulate setae; *o*, *Potamilla reniformis*, ventral view collarette; *p*, same, lateral view; *q*, same, dorsal view; *r*, same, portion of branchial filament; *s*, same, thoracic avicular uncinus from ventral torus; *t*, same, thoracic hoe-like seta from ventral torus; *u*, same, tip of tube, rolled at free end. (For explanation of symbols, see p. 210.)

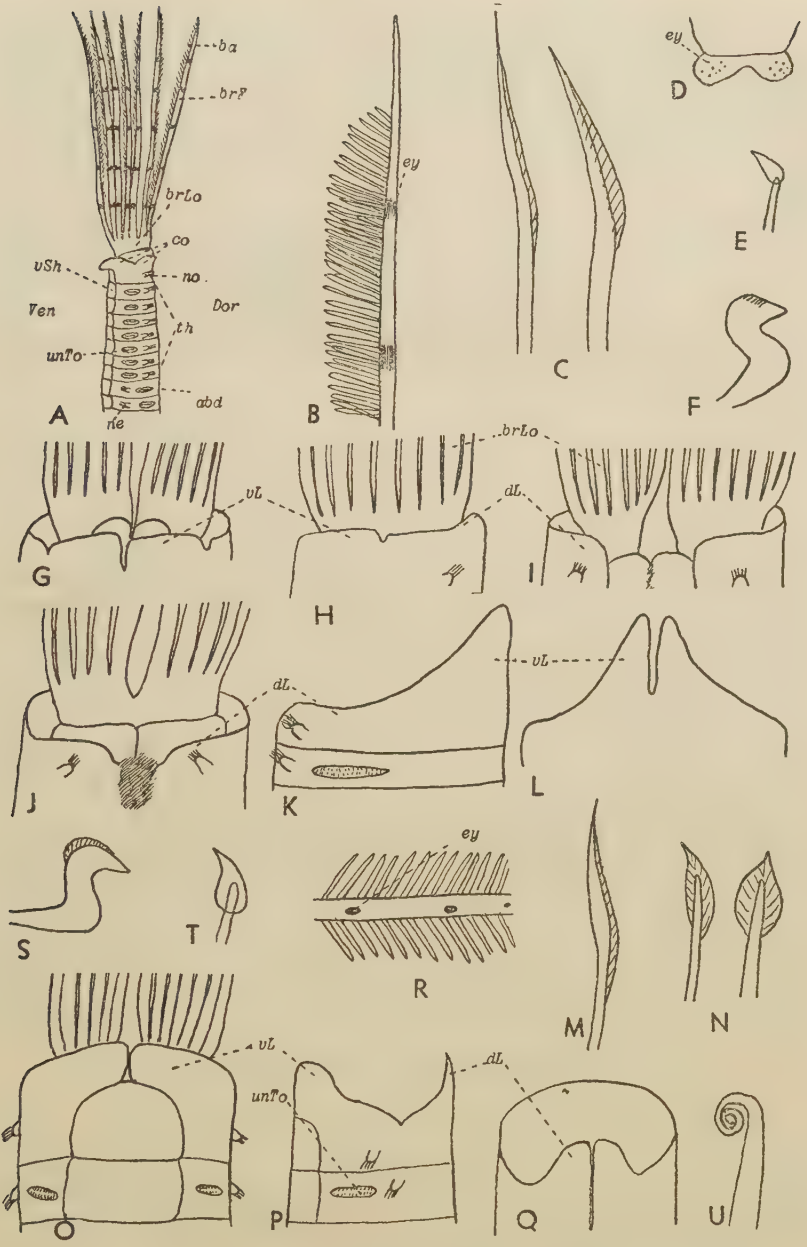


FIGURE 38.—For explanation see facing page.

of setae, dorsal uncinigerous tori and ventral capillary setae. A median ciliated faecal groove runs length of body, ventral in abdominal region and crossing to dorsal surface in thoracic region. Tube cylindrical, permanent or more or less transitory, gelatinous, membranous, or horny, covered or not with mud, sand, gravel, debris of shells.

Represented by five genera and seven species at Point Barrow. All the genera have large branchial plumes composed of two similar semicircular lobes; branchial filaments without large subterminal eyes, without dorsal appendages. First setigerous segments with limbate notosetae only; neurosetae begin on setiger 2. Abdominal region with numerous segments.

### Key to the genera of Sabellidae from Point Barrow

1. Ventral tori of thorax with row of uncini of the avicular form (fig. 38, *f*; in *Sabella* and *Potamilla* with additional row of hoelike setae, fig. 38, *t*). Collarette well developed. Branchial filaments with or without eyes, united at base only, with palmar membrane poorly developed or lacking ..... 2
   Ventral tori of thorax with crotchets with long manubrium (fig. 39, *i*; without tori in *Myxicola*). Branchial filaments without eyes, united along a large part of their length by a well-developed palmar membrane (fig. 39, *m*) ... 3
2. Dorsal thoracic setae all limbate, some long with straight borders, others short with wide borders (fig. 38, *c*) ..... **Sabella** (p. 334)
   Dorsal thoracic setae of two kinds, some limbate, others spatulate (fig. 38, *m*, *n*) **Potamilla** (p. 335)
3. Uncinigerous tori projecting, with short, lateral rows of uncini. Collarette well developed (fig. 39, *a–c*). Dorsal thoracic setae of two kinds, limbate and spatulate (fig. 39, *f*, *g*) ..... 4
   Without projecting uncinigerous tori, abdominal uncini in almost complete transverse band (fig. 39, *p*). Collarette poorly developed, represented by a triangular ventral lobe (fig. 39, *o*). Dorsal thoracic setae all capillary, limbate ..... **Myxicola** (p. 340)
4. Posterior segments without ventral depression ..... **Chone** (p. 337)
   Posterior segments about 10, with ventral suckerlike disc, large ventral depression with flared sides (fig. 39, *n*) ..... **Euchone** (p. 339)

## Genus *Sabella* Linné, 1767 (sensu Malmgren, 1865)

### *Sabella crassicornis* Sars, 1851

FIGURE 38, *a–i*

*Sabella crassicornis* Sars, 1851, p. 202.—Malmgren, 1865, p. 399, pl. 27, fig. 83.—Moore, 1909b, p. 144.—Johansson, 1927, p. 119.—Hartman, 1942a, p. 78; 1948, p. 46.—Berkeley and Berkeley, 1943, p. 130; 1952, p. 114, figs. 236, 237.—Zatsepin, 1948, p. 161, pl. 39, fig. 4.

*Sabella fabricii* Kröyer, 1856, p. 20.—Fauvel, 1927, p. 300, fig. 103, a–g.—Augener, 1928, p. 800.—Annenkova, 1934, p. 322; 1937, p. 195; 1938, p. 211.—Wesenberg-Lund, 1950b, p. 128; 1951, p. 118.

*Sabella spetsbergensis* Malmgren, 1865, p. 399, pl. 29, fig. 93.

*Sabella spitzbergensis* Webster and Benedict, 1887, p. 750.

*Description.*—Length 20–80 mm., width 3–4 mm. Collarette widely separated middorsally, with midventral slit and lateral notches, resulting in 4-lobed structure; ventral lobes closely approximated, may be deflected. Two branchial lobes each with about 16 filaments (15–35), with short tapering tips. Branchial filaments with usually four to six (2–8) pairs of eyes (located in color bands of filaments and may easily be overlooked). Thoracic setigers usually 8 (7–9). Abdomen with one or two pairs of eye-spots between parapodial rami, well developed toward posterior end. Pygidium with pair of bulbous lobes with groups of eye-spots on dorsolateral sides. COLOR: In life: Body flesh color, with branchial filaments banded rusty red, 4–7 transverse bands per filament. In alcohol: Body colorless with reddish purple bands on branchial filaments. TUBE: Cylindrical, free end flexible, covered with thin, smooth layer of mud; embedded part transparent, horny, rigid, covered with sand grains and foreign material.

*New records.*—ARCTIC ALASKA: Off Point Barrow base, up to 15 miles from shore, 36–123.5 fms., on bottoms of stones, mass of worm tubes, and various combinations of gravel, stones, rocks, large perforated rocks, with worm tubes (8 stations, 15 specimens). KAMCHATKA: Petropavlovsk, Grevnitzky, 1888. ALASKA: New Harbor, Unga Island, under stones, Dall, 1872; *Albatross* Sta. 2847, 55°01′ N., 160°18′ W., 48 fms., and station at Kodiak, 1888. CANADIAN ARCTIC: Foxe Basin, 25–31 fms., Bartlett, 1927. EAST COAST NORTH AMERICA: Off Labrador, 5–6 fms., *Blue Dolphin* Expedition, 1949; Bay of Fundy, Maine, Massachusetts, 15 fms., U. S. Fish Commission. CENTRAL AMERICA: Golfo Dulce, west Costa Rica, M. Valerio.

*Distribution.*—Widely distributed in the Arctic: Siberian, Alaskan, and Canadian Arctic, Greenland, Spitsbergen, Novaya Zemlya, Kara Sea. Also Iceland, Faroes, Norway to France, Mediterranean; Hudson Bay to Massachusetts; Bering Sea to California, Central America (Costa Rica); north Japan Sea to Japan. In low water to 230 fathoms.

## Genus *Potamilla* Malmgren, 1865

### Key to the species of Potamilla from Point Barrow

1. Without branchial eyes ..... **P. neglecta**
   With compound eyes in single rows on branchial filaments, 0–8 per filament (fig. 38, *r*) ..... **P. reniformis**

### *Potamilla neglecta* (Sars, 1851)

FIGURE 38, *j–n*

*Sabella neglecta* Sars, 1851, p. 203.

*Potamilla neglecta* Malmgren, 1865, p. 401, pl. 27, fig. 84.—Webster and Benedict, 1884, p. 736.—Moore, 1909b, p. 145; 1923, p. 242.—Johansson, 1927, p. 143.—

Augener, 1928, p. 801.—Hartman, 1942a, p. 81; 1944a, pp. 336, 343; 1948, p. 46.—Zatsepin, 1948, p. 162, pl. 39, fig. 7.—Wesenberg-Lund, 1950a, p. 56; 1950b, p. 128; 1951, p. 119.—Berkeley and Berkeley, 1952, p. 116, fig. 238.

*Potamilla torelli* Malmgren, 1865, p. 402; 1867, p. 114, pl. 13, fig. 76.—Ehlers, 1913, p. 575.—Fauvel, 1927, p. 310, fig. 107, m–s; 1934a, p. 71.—Annenkova, 1934, p. 322; 1937, p. 195; 1938, p. 213.—Wesenberg-Lund, 1951, p. 121.

*Potamilla acuminata* Moore and Bush, 1904, p. 159, pl. 11, figs. 3–6; pl. 12, fig. 41.

*Description.*—Length 30–84 mm., 1–3 mm. wide. Collarette widely separated dorsally, sloping ventrally, with midventral slit, entire laterally, resulting in a 2-lobed structure; ventral lobes triangular, may be deflected. Branchial lobes each with about 16 filaments (6–20), with short, naked distal tips, without eyes. Thoracic setigers usually 8 (5–8). Pygidium with pair of bulbous lobes with dark eyespots. Color: In alcohol: Body colorless, branchiae with two or three diffused reddish brown bands. Tube: Horny, transparent, more or less covered with sand or mud; smaller tubes with rather uniform layer of small sand grains; larger tubes may be encrusted with living barnacles, bryozoans, hydroids, foraminiferans, amphipod tubes. Large yolky eggs in a single layer, pressed close to wall, about one-third way down in tube; a transparent, thin membrane laid down between eggs and worm (large developing yellow eggs found in tube, September 6, 1949, dredged in 36 fathoms, Point Barrow).

*New records.*—Arctic Alaska: Off Point Barrow base, up to 12.1 miles from shore, 21.7–123.5 fms., on bottoms of mass of worm tubes and pebbles, gravel, rocks, large stones (7 stations, 24 specimens). Bering Sea: Albatross Sta. 3496, 56°32′ N., 169°45′ W., 41 fms., 1893; St. Paul Island, Pribilofs, Hahn, 1911. Alaska: Albatross Sta., Kodiak, 1888. West Greenland: Off Hare Island, 70°20′ N., 56° W., 90 fms., U. S. S. *Alert*, 1884. East Coast North America: Off Labrador, 125 fms., *Blue Dolphin* Expedition, 1949; off Maine, Massachusetts, 31–130 fms., U. S. Fish Commission.

*Distribution.*—Widely distributed in the Arctic: Siberian and Alaskan Arctic, Greenland, Spitsbergen. Also Iceland, Faroes, Norway to France, Madeira, Mediterranean, Adriatic, Cape Verde Islands; Labrador to Massachusetts; Bering Sea to California; north Japan Sea to Japan; Antarctic. In low water to 1,044 fathoms.

### *Potamilla reniformis* (Leuckart, 1849)

Figure 38, *o–u*

*Sabella reniformis* Leuckart, 1849, p. 183, pl. 3, fig. 8.

*Potamilla reniformis* Malmgren, 1867, p. 114, pl. 13, fig. 77.—Webster and Benedict, 1884, p. 736; 1887, p. 750.—Johansson, 1927, p. 142.—Fauvel, 1927,

p. 309, fig. 107, a–l.—Okuda, 1937b, p. 61.—Annenkova, 1934, p. 322; 1937, p. 195; 1938, p. 212.—Zatsepin, 1948, p. 161, pl. 39, fig. 6.—Wesenberg-Lund, 1950a, p. 57; 1950b, p. 129; 1951, p. 120.

*Pseudopotamilla intermedia* Moore, 1905c, p. 562, pl. 37, figs. 15–22; 1908, p. 359.—Hartman, 1938c, p. 25, pl. 2, fig. 8; pl. 3, figs. 1–4; 1948, p. 46.—Rioja, 1941, p. 732.

*Pseudopotamilla reniformis* Hartman, 1944a, pp. 336, 343, pl. 21, figs. 3, 6; 1945, p. 47.—Berkeley and Berkeley, 1952, p. 116, fig. 239.

*Description.*—Length 80–100 mm., width 1–2 mm. Collarette with middorsal depression, deeply notched dorsolaterally (at level of notopodia), with midventral slit, resulting in a 4-lobed structure of pair of rounded or triangular dorsal lobes and pair of rounded ventral lobes which may be deflected. Branchial lobes each with about 10 filaments (5–15). At least some of branchial filaments with large compound eyes, usually 0–3 per filament (0–8), eyes may be variable in size or subequal, deep reddish in alcohol. Thoracic setigers usually 10 (7–14). Pygidium with pair of bulbous lobes with eye-spots. Color: In alcohol: Body colorless, branchiae with diffused reddish brown bands in region of eyes. Tube: Somewhat twisted, horny, translucent or opaque, more or less covered with sand or mud, the free end usually flattened, rolled scroll-like when animal pulls inside.

*New records.*—Arctic Alaska: Off Point Barrow base, up to 7.4 miles from shore, 21.7–54.6 fms., on bottoms of pebbles, gravel, rocks, in holes of large stones (2 stations, 15 specimens). Bering Sea: Anchorage, Cape Etoliu, Nunivak Island, 8 fms., Dall, 1874. Southeastern Alaska: Lituya Bay, 6–9 fms., Dall, 1874. East Coast North America: Off Nova Scotia, Maine, New Hampshire, Massachusetts, Rhode Island, Delaware, 10–317 fms., U. S. Fish Commission.

*Distribution.*—Scattered records in the Arctic: Arctic Alaska, Greenland. Also Iceland, Swedish west coast to France, Mediterranean; Nova Scotia to North Carolina; Bering Sea to British Columbia, México; north Japan Sea to Japan. In low water to 317 fathoms.

### Genus *Chone* Kröyer, 1856

Both species have the segments biannulate. Collarette deeply incised middorsally, forming two longitudinal-folded brackets, with sides smooth; without midventral or lateral notches (fig. 39, *a–c*). Branchial filaments united on great part of their length by palmar membrane (fig. 39, *m*). Thoracic setigers 8. Thoracic dorsal setae of three kinds—limbate capillary setae, fine bayonette setae, and spatulate setae with asymmetrical mucronate tips or gently rounded (fig. 39, *f–h*). Pygidium with anus terminal, with rounded to conical bulbous dorsal valve (fig. 39, *d*).

## Key to the species of Chone from Point Barrow

1. Collarette nearly straight (fig. 39, *b*). Free end of branchial filaments flattened, foliaceous, widely limbate (fig. 39, *e*)----------**C. infundibuliformis**
   Collarette oblique, longer on ventral side (fig. 39, *k*). Free end of branchial filaments with long filiform tips (fig. 39, *l*)----------**C. dunéri**

### *Chone infundibuliformis* Kröyer, 1856

FIGURE 39, *a–j*

*Chone infundibuliformis* Kröyer, 1856, p. 33.—Malmgren, 1865, p. 404, pl. 28, fig. 87.—Théel, 1879, p. 66.—Wirén, 1883, p. 422.—Fauvel, 1927, p. 334, fig. 116, a–o.—Augener, 1928, p. 806.—Annenkova, 1934, p. 322; 1937, p. 196; 1938, p. 215.—Hartman, 1942b, p. 136; 1944a, pp. 334, 336 (not pl. 20, fig. 5), pl. 21, fig. 7.—Berkeley and Berkeley, 1943, p. 130; 1952, p. 123, figs. 252, 253.—Gorbunov, 1946, p. 39.—Zatsepin, 1948, p. 164, pl. 39, fig. 13.—Wesenberg-Lund, 1950a, p. 58; 1950b, p. 131; 1951, p. 123.

*Chone gracilis* Moore, 1906b, p. 257, pl. 12, figs. 62–66.—Berkeley and Berkeley, 1952, p. 123, fig. 254.

*Description.*—Length 30 mm., width 2.5 mm. (up to 120 mm. long, 6 mm. wide—Fauvel, 1927). Collarette nearly straight laterally. Branchial filaments about 15 (10–36), with tips more or less foliaceous, edged by transparent border (prolongations of palmar membrane). COLOR: In life: Variable—flesh color, branchiae orange spotted with white; olive green with distal half of branchiae brick red, basal half red and olive, chalk white on outer sides of bases of branchiae. In alcohol: Colorless, grayish, or tannish. TUBE: Membranous, encrusted with sand, mud, or pebbles of variable sizes, foraminiferans.

*New records.*—ARCTIC ALASKA: Eluitkak Pass, Elson Lagoon near Point Barrow, 6.6 fms.; off Point Barrow base, up to 7.5 miles from shore, 20–49 fms., on bottoms of mud, stones, and various combinations of mud, sand, gravel, stones, rocks, large perforated rocks, shells (12 stations, 32 specimens). CANADIAN ARCTIC: East side Cobourg Island, Baffin Bay, 75° 40′ N., 78° 40′ W., Bartlett, 1935. NORTHWEST GREENLAND: 1 mile northwest Conical Rock, Bartlett, 1940. EAST GREENLAND: Off Cape Hold with Hope, 23–40 fms., Bartlett, 1939. SPITSBERGEN: Spitsbergen Sea, U.S.S. *Alliance*, 1881. BERING SEA: St. Paul Island, Pribilofs, Palmer, 1890; St. George Island, Pribilofs, Hanna, 1913; *Albatross* Sta. 3232, 58° 30′ N., 157° 34′ W., 10.5 fms., 1890, Sta. 3233, 58° 23′ N., 157° 42′ W., 7 fms., 1890, and Sta. 3289, 56° 44′ N., 159° 16′ W., 16 fms., 1890; Kiska, Aleutians, Dall. WEST COAST NORTH AMERICA: Strait of Juan de Fuca, Washington, 40 fms., mud, Pettibone. EAST COAST NORTH AMERICA: Off Nova Scotia, Maine, Massachusetts, Rhode Island, 10–206 fms., U. S. Fish Commission.

*Distribution.*—Widely distributed in the Arctic: Siberian, Alaskan, and Canadian Arctic, Greenland, Spitsbergen, Novaya Zemlya, Kara

Sea. Also Iceland, Faroes, Shetlands, Scandinavian coast to Danish waters; Hudson Bay to Rhode Island; Bering Sea to California; north Japan Sea. In low water to 1,955 fathoms.

#### *Chone dunéri* Malmgren, 1867

FIGURE 39, *k*, *l*

*Chone dunéri* Malmgren, 1867, p. 116, pl. 13, fig. 75.—Wirén, 1883, p. 422.—Fauvel, 1927, p. 336, fig. 117, l–r; 1934a, p. 74.—Augener, 1928, p. 807.—Monro, 1936, p. 189.—Treadwell, 1937, p. 35.—Berkeley and Berkeley, 1944, p. 5.—Zatsepin, 1948, p. 164, pl. 39, fig. 15.—Wesenberg-Lund, 1950a, p. 58; 1950b, p. 130; 1951, p. 123.—Hartman, 1951, p. 117.

*Description.*—Length 20–35 mm., width 1.5–2.5 mm. Collarette oblique, longer on ventral side. Branchial filaments about 10 (5–11), with long, tapered tips. COLOR: In life: Branchiae yellow. In alcohol: Colorless or tannish. TUBE: Thin, membranous, encrusted with sand.

*New records.*—ARCTIC ALASKA: Off Point Barrow base, up to 7.5 miles from shore, 13.3–49 fms., on bottoms of mud and various combinations of mud, sand, gravel, stones, rocks, large perforated rocks, shells (9 stations, 21 specimens). CANADIAN ARCTIC: Baffin Island, 66° 43′ N., 80° 07′ W., Bartlett, 1927. EAST COAST NORTH AMERICA: Off Labrador, 8 fms., mud, *Blue Dolphin* Expedition, 1949.

*Distribution.*—Widely distributed in the Arctic: Alaskan and Canadian Arctic, Greenland, Spitsbergen, Novaya Zemlya, Kara Sea. Also Iceland, Faroes, Norway to North Sea, Madeira, Mediterranean, Adriatic; Labrador; Florida; west coast South America (Perú). In 8–889 fathoms.

### Genus *Euchone* Malmgren, 1865

#### *Euchone analis* (Kröyer, 1856)

FIGURE 39, *m*, *n*

*Sabella analis* Krŏyer, 1856, p. 17.

*Euchone analis* Malmgren, 1865, p. 406, pl. 28, fig. 88.—Théel, 1879, p. 65.—Wirén, 1883, p. 423.—Chamberlin, 1920, p. 27.—Augener, 1928, p. 804.—Annenkova, 1937, p. 196; 1938, p. 216.—Berkeley and Berkeley, 1943, p. 130; 1952, p. 121, figs. 250, 251.—Gorbunov, 1946, p. 39.—Zatsepin, 1948, p. 163, pl. 39, fig. 12.—Wesenberg-Lund, 1950a, p. 59; 1950b, p. 132; 1951, p. 124.

*Description.*—Length 19–28 mm., width 1.8 mm. (up to 60 mm. long—Augener, 1928). Segments biannulate and, with the ventral faecal groove, forming four large areas per segment. Collarette with opening dorsally, nearly straight and entire laterally, with shallow midventral incision. Branchial filaments about 10 per lobe (up to 14), united through a great part of their length by a well-developed palmar membrane. Thoracic setigers 8. Ventral anal

depression extending over 10–12 most posterior segments, bordered by high sinuous membrane. Pygidium with terminal anus, with conical bulbous dorsal valve. Colorless or tannish in alcohol. Tube membranous, encrusted with sand grains and certain amount of debris.

*New records.*—Arctic Alaska: Off Point Barrow base, up to 12.1 miles from shore, 36–123.5 fms., on bottoms of mass of worm tubes and stones, rocks, large perforated rocks (3 stations, 3 specimens). East Coast North America: Off Labrador, 30 fms., mud with rock, *Blue Dolphin* Expedition, 1950.

*Distribution.*—Widely distributed in the Arctic: Siberian, Alaskan, and Canadian Arctic, Davis Strait, Greenland, Jan Mayen, Spitsbergen, Novaya Zemlya, Kara Sea. Also Iceland, Norway to Danish waters; Hudson Bay to Labrador; Bering Sea to British Columbia; north Japan Sea. In 2–389 fathoms.

### Genus *Myxicola* (Koch in MS.) Rénier, 1848

#### *Myxicola infundibulum* (Montagu, 1808)

Figure 39, *o–q*

*Amphitrite infundibulum* Montagu, 1808, p. 109, pl. 8.

*Myxicola steenstrupii* Kröyer, 1856, p. 35.—Malmgren, 1865, p. 408, pl. 29, fig. 90.—Théel, 1879, p. 66.—Webster and Benedict, 1884, p. 737; 1887, p. 750.—Moore, 1909b, p. 144.—Eliason, 1920, p. 79.—Zatsepin, 1948, p. 164, pl. 39, fig. 16.

*Myxicola infundibulum* Fauvel, 1927, p. 342, fig. 119, a–i; 1934a, p. 74; 1936, p. 86.—Annenkova, 1934, p. 322.—Okuda, 1939, p. 243.—Hartman, 1944a, pp. 335, 343, pl. 21, fig. 1; 1948, p. 47.—Wesenberg-Lund, 1950b, p. 134; 1951, p. 125.—Berkeley and Berkeley, 1952, p. 119, fig. 244.

*Description.*—Length 23 mm., width 5 mm. (up to 200 mm. long, 15 mm. wide—Fauvel, 1927). Collarette represented by a triangular ventral lobe extending anteriorly between the branchial lobes, absent laterally and dorsally. A middorsal groove on first 8–10 segments. Branchial filaments 20–40, united for greater part of their length by

---

Figure 39.—Sabellidae: *a*, *Chone infundibuliformis*, ventral view collarette; *b*, same, lateral view; *c*, same, dorsal view; *d*, same, dorsal view pygidium; *e*, same, tip of foliaceous branchial filament; *f*, same, thoracic dorsal limbate capillary seta; *g*, same, thoracic dorsal spatulate seta; *h*, same, thoracic dorsal bayonette seta; *i*, same, thoracic crotchet from ventral torus; *j*, same, abdominal uncinus; *k*, *Chone duneri*, lateral view collarette; *l*, same, tip of branchial filament; *m*, *Euchone analis*, lateral view anterior end; *n*, same, ventral view posterior end; *o*, *Myxicola infundibulum*, lateral view anterior end; *p*, same, lateral view segment from abdominal region; *q*, same, dorsal view pygidium. Serpulidae: *r*, *Spirorbis granulatus*, dorsal view tube; *s*, same, operculum (after Fauvel); *t*, same, collar seta (seta of first setiger); *u*, *Spirorbis spirillum*, dorsal view anterior end extended from tube (var. *ascendens*, after Emerton); *v*, same, discoidal form of tube; *w*, same, operculum; *x*, same, collar seta (seta of first setiger, after Fauvel). (For explanation of symbols, see p. 210.)

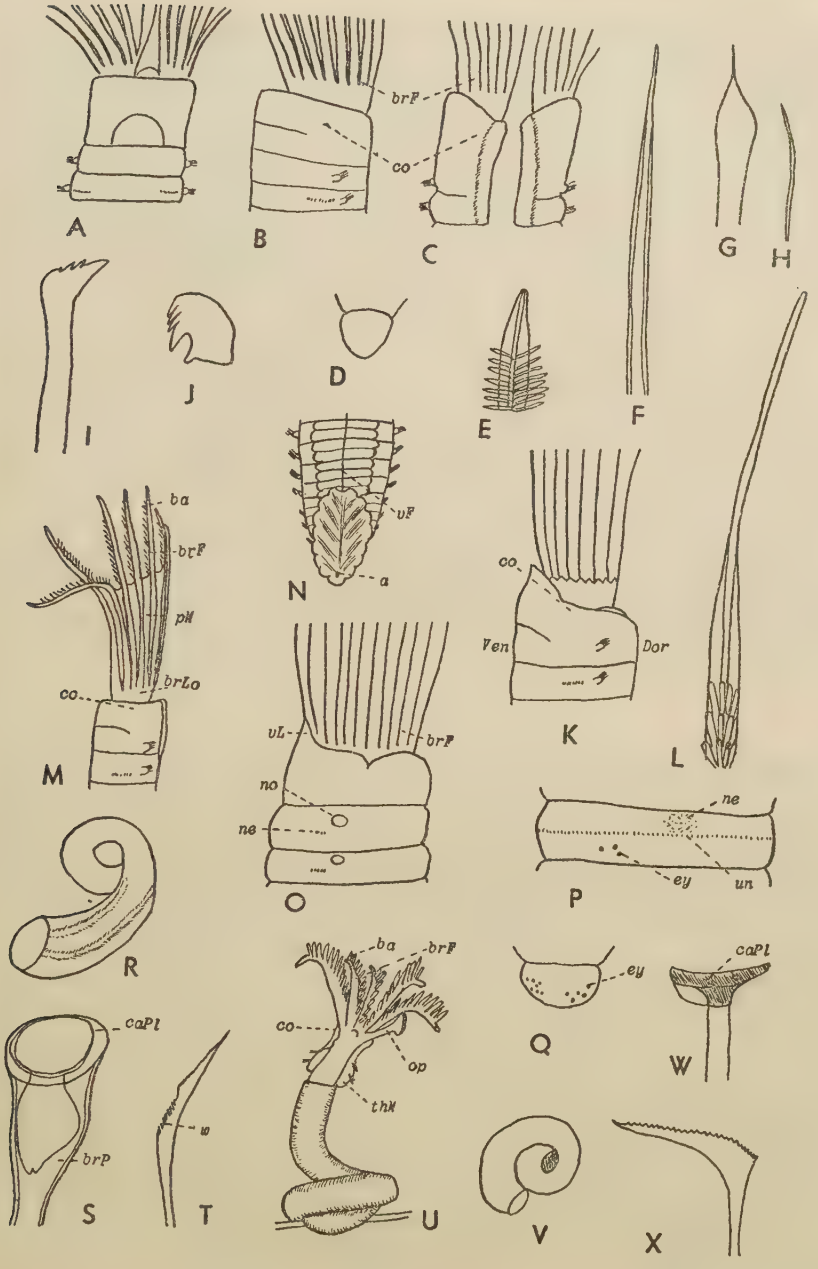


FIGURE 39.—For explanation see facing page.

well-developed palmar membrane; tips of filaments limbate. Thoracic setigers 8 (7–9). Thoracic notopodia with limbate capillary setae; neuropodia with crotchets with long manubrium (may disappear). Abdomen without projecting tori; avicular uncini in an almost complete circle; with capillary neurosetae. With one to several lateral eye-spots behind each parapodia. Pygidium with anus terminal, with rounded, bulbous dorsal valve with lateral groups of eye-spots. COLOR: In alcohol: Body irregularly speckled reddish brown, with branchiae violet distally. TUBE: Gelatinous, transparent, very firm and elastic, may be quite thick.

*New records.*—ARCTIC ALASKA: Off Point Barrow base, up to 4.25 miles from shore, 25–35.5 fms., on bottoms of mud with gravel (2 stations, 2 specimens). WEST COAST NORTH AMERICA: Washington and Puget Sounds, low water to 165 fms., Pettibone. EAST COAST NORTH AMERICA: Off Nova Scotia, Maine, Massachusetts, 9–90 fms., U. S. Fish Commission.

*Distribution.*—Scattered records in the Arctic: Arctic Alaska, West Greenland, Novaya Zemlya. Also Iceland, Finland, to English Channel, Mediterranean, Adriatic; Nova Scotia to Massachusetts; Bering Sea to California; Japan. In low water to 287 fathoms.

## Family SERPULIDAE

Body cylindrical or fusiform, slightly flattened. Prostomium indistinct. Buccal region with mouth terminal, with two transverse lips, palps absent or slightly developed. Branchiae form a terminal funnel-like plume around mouth, formed of two semicircular or spiralled lobes bearing few to numerous filaments, each with two rows of ciliated barbules (fig. 39, *u*). Usually with one or two opercula (calcareous, horny, or membranous) formed on the first dorsal filaments of the branchial lobes. Usually with a collarette on first segment. Body divided into two regions: (1) thoracic; with few segments (3–7), with dorsal bundles of capillary setae and ventral uncinigerous tori; usually with a thoracic membrane; (2) abdominal; with inversion of setae, dorsal uncinigerous tori and ventral capillary setae. A wide, shallow, longitudinal ciliated faecal groove, ventral in abdominal region, dorsal in thoracic. Tube cylindrical or polygonal, calcareous, opaque or rarely transparent, fixed to substratum (rarely free).

Represented by a single genus and two species (two subgenera) at Point Barrow.

### Genus *Spirorbis* Daudin, 1800

Both species are of small size, asymmetrical and coiled. Branchial lobes each with 3–5 filaments. A single, partly calcareous operculum

on smooth peduncle. Collarette large, widely separated dorsally, entire laterally and ventrally. Three thoracic setigers, the first setiger with only dorsal setae (collar setae) and the next two with ventral tori in addition to dorsal setae. With well-developed thoracic membrane. A long achaetous region between thorax and abdomen (may be crowded with ova; spermatozoa develop in more posterior segments; hermaphroditic). About 20 abdominal setigers. Pygidium with two rounded lobes. Colorless in alcohol. Tube small (1–3 mm. in diameter), closely coiled, white, opaque, fixed to hydroids, bryozoa, algae, carapaces of crustaceans, spines of tunicates, stones, etc.

### Key to the species of Spirorbis from Point Barrow

1. Tube with sinistral (counterclockwise) spiral coiling (with mouth of tube facing observer, the opening is on the left; fig. 39, *r*). Eggs incubated in operculum. Collar setae with well-developed basal crenulate wings (fig. 39, *t*)_____**S. (Laeospira) granulatus**

Tube with dextral (clockwise) spiral coiling (fig. 39, *v*). Eggs incubated in tube. Collar setae without crenulate wings (fig. 39, *x*).

**S. (Dexiospira) spirillum**

#### *Spirorbis (Laeospira) granulatus* (Linné, 1767)

FIGURE 39, *r–t*

*Serpula granulata* Linné, 1767, p. 1266.

*Spirorbis quadrangularis* Stimpson, 1854, p. 29.—Moore, 1908, p. 362.—Hartman, 1944a, pp. 336, 343.

*Spirorbis (Laeospira) granulatus* Borg, 1917, p. 28, figs. 14–16.—Fauvel, 1927, p. 403, fig. 137, q–u.—Augener, 1928, p. 815.—Annenkova, 1937, p. 198; 1938, p. 219.—Berkeley and Berkeley, 1943, p. 130; 1952, p. 137, figs. 286, 287.—Gorbunov, 1946, p. 39.—? Thorson, 1946, p. 139, fig. 80.—Zatsepin, 1948, p. 166.—Wesenberg-Lund, 1950a, p. 63; 1950b, p. 141; 1951, p. 135.

*Description.*—Tube 1–2 mm. in diameter, dull chalky white, opaque, somewhat rugose and variable with two longitudinal ridges, one on each side (the opening almost quadrangular), or with three more or less distinct longitudinal keels, or without crests; the tube is coiled sinistrally, up to two coils, flatly on smooth surfaces or somewhat open when on rough surfaces; it may encircle a strand of hydroid and the free end may extend upward. Operculum with terminal plate strongly convex, calcareous, with long, cylindrical projection (short on one side, longer on opposite side), with large brood pouch for incubating eggs (eggs in operculum, Point Barrow, August 17, 1949, and February 18, 1950). Collar setae with blades finely serrated, with well-developed crenulate wing at base.

*New records.*—ARCTIC ALASKA: Off Point Barrow base, up to 12.1 miles from shore, 27–123.5 fms., on bottoms of mass of worm tubes,

and various combinations of mud, gravel, rocks, stones (3 stations, 7 specimens). Southwestern Alaska: Kiska Harbor, Aleutians, 10 fms., Dall, 1873; Canoe Bay, 25 fms., on old clam shell, Alaska King Crab Investigation, 1940. East Coast North America: Off Labrador, 30–35 fms., mud, rocks, *Blue Dolphin* Expedition, 1950; off Nova Scotia, Maine, Massachusetts, North Carolina (Cape Hatteras), 17–34 fms., U. S. Fish Commission.

*Distribution.*—Widely distributed in the Arctic: Siberian and Alaskan Arctic, Greenland, Jan Mayen, Spitsbergen, Franz Josef Land, Novaya Zemlya, Kara Sea. Also Iceland, Faroes, Norway to France; Hudson Bay to North Carolina; Alaska to British Columbia; north Japan Sea. In low water to 239 fathoms.

### *Spirorbis (Dexiospira) spirillum* (Linné, 1758)

Figure 39, *u–x*

*Serpula spirillum* Linné, 1758, p. 785.

*Spirorbis (Dexiospira) spirillum* Borg, 1917, p. 20, figs. 3, 4.—Fauvel, 1927, p. 392, fig. 132, f–p.—Augener, 1928, p. 814.—Annenkova, 1934, p. 322; 1937, p. 197; 1938, p. 218.—Treadwell, 1937, p. 35.—Hartman, 1942a, p. 91; 1944a, pp. 336, 343, pl. 22, fig. 2.—Berkeley and Berkeley, 1943, p. 130; 1952, p. 133, figs. 272–274.—Thorson, 1946, p. 138.—Gorbunov, 1946, p. 39.—Zatsepin, 1948, p. 166.—Wesenberg-Lund, 1950a, p. 62; 1950b, p. 138; 1951, p. 132.

*Circeis spirillum* Chamberlin, 1920, p. 28.

*Dexiospira spirillum* Hartman, 1944b, p. 287; 1948, p. 51; 1951, p. 121.—Hartman and Reish, 1950, p. 47.

*Description.*—Tube 1–3 mm. in diameter, white, opaque (may be somewhat translucent), shiny, smooth, porcellaneous, coiled dextrally, up to 3½ coils; tube may be coiled flatly (discoidal form) when attached to smooth surfaces, or partly unrolled, the last coil or part of last coil raised from substratum (var. *ascendens* Levinsen, var. *lucidus* Mörch) when attached to rough surfaces, as branching bryozoan colonies. Operculum with shallow, calcareous, concave, terminal plate, with slight projection (talon) on under side. Collar setae with serrate blades, without basal crenulate wings. Embryos incubated in tube (eggs in tube, Point Barrow, September 9, 1948, and August 30, 1949).

*New records.*—Arctic Alaska: Off Point Barrow base, up to 8 miles from shore, 21–75.5 fms., on bottoms of stones and various combinations of gravel, rocks, on bryozoa, on *Hyas coarctatus*, on spines of *Boltenia echinata* (8 stations, 39 specimens). Gulf of Alaska: *Albatross* Sta., Observation Island, Cordova, 1914. West Greenland: Godhavn, Greely Relief Expedition, 1884. East Coast North America: Off Labrador, 10–40 fms., *Blue Dolphin* Expeditions, 1949, 1950, 1951; off Nova Scotia, Maine, Massachusetts, Long Island Sound, 16–83 fms., U. S. Fish Commission.

*Distribution.*—Widely distributed in the Arctic: Siberian, Alaskan, and Canadian Arctic, Greenland, Spitsbergen, Franz Josef Land, Kara Sea. Also Iceland, Faroes, Norway to France; Hudson Bay to Long Island Sound, southern Texas; Bering Sea to México; north Japan Sea to Japan. In low water to 183 fathoms.

## References


Alaejos y Sanz, Luís.

1905. Estudio descriptivo de algunas especies de polinoinos de las costas de Santander. Mem. Soc. Española Hist. Nat., vol. 3, pp. 1–76 12 pls.

Andrews, E. A.

1891. Report upon the Annelida Polychaeta of Beaufort, North Carolina. Proc. U. S. Nat. Mus., vol. 14, pp. 277–302, pls. 12–18.

Annenkova, N. P.

1929. Beiträge zur Kenntnis der Polychaeten-Fauna der U.S.S.R. 1. Fam. Pectinariidae Quatrefages und Ampharetidae Malmgren. Ann. Mus. Zool. Acad. Leningrad, vol. 30, pp. 477–502, pls. 37–39.

1931. Die Polychaeten in den Sammlungen der Jakutischen Expedition der Akademie der Wissenschaften der U.S.S.R. Zool. Anz., vol. 95, pp. 203–205, 4 figs.

1932. Zur Fauna der Polychaeten des Leptev-Meeres. Issled. Moreĭ USSR, Gosud, Gidrol. Inst., Leningrad, fasc. 15, pp. 133–139, figs. 1–7.

1934. Kurze übersicht der Polychaeten der Litoralzone der Bering-Insel (Kommandor-Inseln), nebst Beschreibung neuer Arten. Zool. Anz., vol. 106, pp. 322–331, 11 figs.

1937. The polychaete fauna of the northern part of the Japan Sea. Issled. Moreĭ USSR, Gosud. Gidrol. Inst., Leningrad, fasc. 23, pp. 139–216, 12 figs., 5 pls.

1938. Polychaeta of the North Japan Sea and their horizontal and vertical distribution. *In* Reports of the Japan Sea Hydrobiological Expedition of the Academy of Sciences of the USSR in 1934, pt. 1, pp. 81–230, 16 figs.

1946. New species of Polychaeta from the Arctic Ocean. Trudy Dreifuŝshchei ekspeditsii Glavsevmorputi na ledokolnom parokhode *G. sedov* 1937–1940, vol. 3, pp. 185–188, 3 figs. (Leningrad Vsesoŝuznyĭ arkticheskiĭ institut).

Arwidsson, Ivar

1898. Studien über die Familien Glyceridae und Goniadidae. Bergens Mus. Åarb., No. 11, pp. 1–69, 4 pls.

1907. Studien über die skandinavischen und arktischen Maldaniden nebst Zusammenstellung der übrigen bisher bekannten Arten dieser Familie. Zool. Jahrb., suppl. 9, pt. 1, pp. 1–308, 12 pls.

1911a. Die Maldaniden. Wissenschaftlichen Ergebnisse der Schwedischen Südpolar-Expedition 1901–1903. Vol. 6, pt. 6, pp. 1–44, 2 pls.

1911b. On some Irish Maldanidae. Proc. Roy. Irish Acad. Dublin, vol. 29B, No. 6, pp. 209–228, pls. 17–19.

1922. Systematic notes on some Maldanids. Kongl. Svenska Vetensk. Akad. Handl., vol. 63, No. 7, pp. 1–46, 2 pls.

Ashworth, James Hartley

1910. The annelids of the family Arenicolidae of North and South America, including an account of *Arenicola glacialis* Murdoch. Proc. U. S. Nat. Mus., vol. 39, No. 1772, pp. 1–32, figs. 1–14.

1912. Catalogue of the Chaetopoda in the British Museum (Natural History). A. Polychaeta: Pt. I. Arenicolidae. Pp. 1–175, 68 figs., 15 pls.

1924. The rediscovery of *Arenicola glacialis* Murdoch, with observations on its characters and on its status. Rep. Canadian Arctic Exped. 1913–18. Pt. J: Polychaeta, suppl. 1, vol. 9, pp. 3j–7j, 1 fig.

AUGENER, HERMANN

1913. Polychaeten von Franz-Joseph-Land. I, II. Zool. Anz., vol. 41, pp. 202–220, 253–273.

1928. Die Polychäten von Spitzbergen. *In* Fauna Arctica. Römer und Schaudinn, vol. 5, pt. 3, pp. 649–834, pl. 11.

1939. Beitrag zur Polychaetenfauna der Ostsee. Kieler Meersf., vol. 3, pt. 1, pp. 133–147, 3 figs.

BERGSTRÖM, ERIK

1914. Zur Systematik der Polychaetenfamilie der Phyllodociden. Zool. Bidr. Uppsala, vol. 3, pp. 37–224, 81 figs., pls. 1–5.

BERKELEY, EDITH

1930. Polychaetous annelids from the Nanaimo District. 5. Ammocharidae to Myzostomidae. Contr. Canadian Biol. Fish., new ser., vol. 6, No. 5, pp. 67–77, fig. 1.

BERKELEY, EDITH, and BERKELEY, CYRIL

1936. Notes on Polychaeta from the coast of western Canada. I. Spionidae. Ann. Mag. Nat. Hist., ser. 10, vol. 18, pp. 468–477, 1 fig.

1938. Notes on Polychaeta from the coast of western Canada. II. Syllidae. Ann. Mag. Nat. Hist., ser. 11, vol. 1, pp. 33–49, 12 figs.

1942. North Pacific Polychaeta, chiefly from the west coast of Vancouver Island, Alaska, and Bering Sea. Canadian Journ. Res., vol. 20, pp. 183–208, 6 figs.

1943. Biological and oceanographical conditions in Hudson Bay. II. Polychaeta from Hudson Bay. Journ. Fish. Res. Board Canada, vol. 6, No. 2, pp. 129–132.

1944. Polychaeta from the western Canadian Arctic region. Canadian Journ. Res., vol. 22, pp. 1–5, 6 figs.

1945. Notes on Polychaeta from the coast of western Canada. III. Ann. Mag. Nat. Hist., ser. 11, vol. 12, pp. 316–335, 6 figs.

1948. Annelida, Polychaeta errantia. *In* Canadian Pacific Fauna. Fish. Res. Board Canada, No. 9b (1), pp. 1–100, 160 figs.

1950. Notes on Polychaeta from the coast of western Canada. IV. Polychaeta sedentaria. Ann. Mag. Nat. Hist., ser. 12, vol. 3, No. 25, pp. 50–69, 8 figs.

1952. Annelida, Polychaeta sedentaria. *In* Canadian Pacific Fauna. Fish. Res. Board Canada, No. 9b (2), pp. 1–139, 292 figs.

BORG, FOLKE

1917. Über die Spirorbisarten Schwedens nebst einem Versuch zu einer neuen Einteilung der Gattung *Spirorbis*. Zool. Bidr. Uppsala, vol. 5, pp. 14–48, 16 figs.

CHAMBERLIN, RALPH V.

1919. Pacific coast Polychaeta collected by Alexander Agassiz. Bull. Mus. Comp. Zool., vol. 63, No. 6, pp. 251–276, pls. 1–3.

1920. The polychaetes collected by the Canadian Arctic Expedition, 1913–18. Rep. Canadian Arctic Exped. 1913–18, pt. B, vol. 9, pp. 1–41, 6 pls.

CLAPARÈDE, ÉDOUARD

1868. Les annélides chétopodes du Gulfe de Naples. Mém. Soc. Phys. Genève, vol. 19, pt. 2, pp. 313–584, 16 pls.

Dalyell, John Graham
1853. The powers of the Creator displayed in the Creation. Vol. 2, pp. 1–359, 46 pls.

Ditlevsen, Hjalmar
1909. Annulata Polychaeta. *In* Report of the second Norwegian Arctic expedition in the *Fram*, 1898–1902, vol. 3, No. 15, pp. 1–23, 3 pls.
1911. Annelids from the Danmark Expedition. *In* Danmark-Ekspeditionen til Grønlands Nordøstkyst 1906–1908, vol. 5, No. 9, pp. 411–432, pls. 27–31.
1917. Annelids. I. *In* The Danish *Ingolf*-Expedition, vol. 4, pt. 4, pp. 1–71, 24 figs., 6 pls.
1929. Polychaeta. *In* Zoology of the Faroes. No. 16, pp. 1–83.
1937. Polychaeta. The Godthaab Expedition, 1928, vol. 80, No. 4, pp. 1–64, 6 figs.

Ehlers, Ernst
1868. Die Borstenwürmer (Annelida Chaetopoda) nach systematischen und anatomischen untersuchungen dargestellt, vol. 2, pp. 269–748, pls. 12–24.
1913. Die Polychaeten-Sammlungen. *In* Deutschen Südpolar-Expedition, 1901–1903, Zool., vol. 5, pt. 4, pp. 399–602, pls. 26–46.

Eliason, Anders
1920. Biologisch-Faunistische Untersuchungen aus dem Öresund. V. Polychaeta. Acta Univ. Lundensis, new ser., vol. 16, pt. 6, pp. 1–103, 18 figs.

Fabricius, Otto
1780. Fauna groenlandica. . . . Pp. 1–452, 12 figs.
1799. Betragtninger over Nereide-slaegten. Skrivter af Naturh. Selsk., vol. 5, pp. 154–190, pl. 4.

Fauvel, Pierre
1911. Annélides polychètes. *In* Campagne Arctique de 1907, Duc d'Orléans, pt. 9, pp. 1–44, 1 pl.
1914. Annélides polychètes non pélagiques provenant des campagnes de l'*Hirondelle* et de la *Princesse-Alice* (1885–1910), fasc. 46, pp. 1–432, 31 pls.
1923. Polychètes errantes. Faune de France, vol. 5, pp. 1–488, 181 figs.
1927. Polychètes sédentaires. Faune de France, vol. 16, pp. 1–494, 152 figs.
1932. Annelida polychaeta of the Indian Museum, Calcutta. Mem. Indian Mus., vol. 12, No. 1, pp. 1–262, 40 figs., 9 pls.
1933. Annélides polychètes du Golfe du Pei Tcheu Ly. Publ. Mus. Hoang ho Pai ho de Tien Tsin, No. 15, pp. 1–67, 6 figs.
1934a. Annélides polychètes de Rovigno d'Istria. Thalassia, vol. 1, No. 7, pp. 1–78, 4 figs.
1934b. Sur quelques syllidiens du Japon. Annot. Zool. Japon., vol. 14, No. 3, pp. 301–315, 2 figs.
1936. Annélides polychètes du Japon. Mem. Coll. Sci. Kyoto Univ., ser. B, vol. 12, No. 1, pp. 41–92, 1 fig.
1947. Annélides polychètes de Nouvelle-Calédonie et des Îles Gambier. *In* Faune de l'Empire Français, vol. 8, pp. 1–107, 90 figs.

Friedrich, Hermann
1939. Polychaeten-Studien. IV. Zur Polychaeten fauna der Barents-See. Kieler Meeresf., vol. 3, pt. 1, pp. 122–132, 6 figs.

Gorbunov, G. P.
1946. Bottom life of the Novosiberian shoalwaters and the central part of the Arctic ocean. Trudy Dreifuŭshchei ekspeditsii Glavsevmorputi na ledokolnom parokhode *G. Sedov* 1937–1940, vol. 3, pp. 30–138, 1 pl. (Leningrad Vsesoŭznyĭ arkticheskiĭ institut).

Grube, Adolph Eduard
1840. Actinien, Echinodermen und Würmen des Adriatischen und Mittelmeers. . . . Pp. 61–88, 1 pl.
1855. Beschreibungen neuer oder wenig bekannter Anneliden. Arch. Naturg., vol. 21, pt. 1, pp. 81–136, pls. 3–5.
1860. Beschreibung neuer oder wenig bekanter Anneliden. Arch. Naturg., vol. 26, pt. 1, pp. 71–118, pls. 3–5.

Gustafson, Gunnar
1936. Polychaeta and Sipunculoidea from the Siberian Arctic ocean. *In* The Norwegian North Polar expedition with the *Maud*, 1918–1925, Scientific Results, vol. 5, No. 17, pp. 1–12.

Hansen, G. Armauer
1882. Anneliden fra den Norske Nordhavs-Expedition, 1876–1878. Den Norske Nordhavs-Exped., pt. 7, pp. 1–53, 7 pls.

Hartman, Olga
1936a. A review of the Phyllodocidae (Annelida Polychaeta) of the coast of California, with descriptions of nine new species. Univ. Calif. Publ. Zool., vol. 41, No. 10, pp. 117–132, 51 figs.
1936b. New species of polychaetous annelids of the family Nereidae from California. Proc. U. S. Nat. Mus., vol. 83, No. 2994, pp. 467–480, figs. 46–53.
1936c. New species of Spionidae (Annelida Polychaeta) from the coast of California. Univ. Calif. Publ. Zool., vol. 41, No. 6, pp. 45–52, 22 figs.
1938a. The types of the polychaete worms of the familes Polynoidae and Polyodontidae in the United States Museum and the description of a new genus. Proc. U. S. Nat. Mus., vol. 86, pp. 107–134, 41 figs.
1938b. Review of the annelid worms of the family Nephtyidae from the northeast Pacific, with descriptions of five new species. Proc. U. S. Nat. Mus., vol. 85, No. 3034, pp. 143–158, figs. 62–67.
1938c. Annotated list of the types of polychaetous annelids in the Museum of Comparative Zoology. Bull. Mus. Comp. Zool., vol. 85, No. 1, pp. 1–31, 3 pls.
1939. Polychaetous annelids. Pt. I. Aphroditidae to Pisionidae. Allan Hancock Pacific Exped., vol. 7, No. 1, pp. 1–156, 28 pls.
1940. Polychaetous annelids. Pt. II. Chrysopetalidae to Goniadidae. Allan Hancock Pacific Exped., vol. 7, No. 3, pp. 173–286, pls. 31–44.
1941a. Some contributions to the biology and life history of Spionidae from California. Allan Hancock Pacific Exped., vol. 7, No. 4, pp. 289–322, pls. 45–48.
1941b. Polychaetous annelids. Pt. IV. Pectinariidae. Allan Hancock Pacific Exped., vol. 7, No. 5, pp. 325–344, pls. 49–52.
1942a. A review of the types of polychaetous annelids at the Peabody Museum of Natural History, Yale University. Bull. Bingham Oceanogr. Coll., vol. 8, pt. 1, pp. 1–98, 161 figs.

1942b. The identity of some marine annelid worms in the United States National Museum. Proc. U. S. Nat. Mus., vol. 92, No. 3142, pp. 101–140, figs. 8–15.

1942c. Report on the scientific results of the *Atlantis* expeditions to the West Indies under the joint auspices of the University of Havana and Harvard University. Mem. Soc. Cubana Hist. Nat., vol. 16, No. 2, pp. 89–104, pls. 8–9.

1944a. New England Annelida. Pt. 2, including the unpublished plates by Verrill with reconstructed captions. Bull. Amer. Mus. Nat. Hist., vol. 82, No. 7, pp. 327–344, pls. 13–35 [45–60].

1944b. Polychaetous annelids from California including the descriptions of two new genera and nine new species. Allan Hancock Pacific Exped., vol. 10, No. 2, pp. 239–307, pls. 19–26.

1944c. Polychaetous annelids. Pt. VI. Paraonidae, Magelonidae, Longosomidae, Ctenodrilidae, and Sabellariidae. Allan Hancock Pacific Exped., vol. 10, No. 3, pp. 311–388, pls. 27–42.

1944d. Polychaetous annelids. Allan Hancock Atlantic Exped., Rep. No. 3, pp. 1–32, 2 pls.

1945. The marine annelids of North Carolina. Bull. Duke Univ. Marine Sta., No. 2, pp. 1–51, 10 pls.

1947. Polychaetous annelids. Pt. VII. Capitellidae. Allan Hancock Pacific Exped., vol. 10, No. 4, pp. 391–480, pls. 43–58.

1948. The polychaetous annelids of Alaska. Pacific Sci., Univ. Hawaii, vol. 2, No. 1, pp. 3–58, 12 figs.

1950. Goniadidae, Glyceridae and Nephtyidae. Allan Hancock Pacific Exped., vol. 15, No. 1, pp. 1–180, 19 pls., 3 figs.

1951. The littoral marine annelids of the Gulf of Mexico. Publ. Inst. Marine Sci., vol. 2, No. 1, pp. 7–124, 27 pls.

1952. The marine annelids of the United States Navy Antarctic Expedition, 1947–1948. Journ. Washington Acad. Sci., vol. 42, No. 7, pp. 231–237, 12 figs.

HARTMAN, OLGA, and REISH, DONALD J.

1950. The marine annelids of Oregon. Oregon State Monogr. Studies in Zool., No. 6, pp. 1–64, 5 pls.

HESSLE, CHRISTIAN

1917. Zur Kenntnis der Terebellomorphen Polychaeten. Zool. Bidr Uppsala, vol. 5, pp. 39–258, 66 figs., pls. 1–5.

JOHANSSON, KARL ERIK

1926. Berkmurkungen über die Kinberg'schen Arten der Familien Hermellidae und Sabellidae. Ark. Zool. Stockholm, vol. 18A, No. 7, pp. 1–28, 9 figs.

1927. Beiträge zur Kenntnis der Polychaeten Familien Hermellidae, Sabellidae und Serpulidae. Zool. Bidr. Uppsala, vol. 11, pp. 1–184, 15 figs., 5 pls.

JOHNSON, HERBERT PARLIN

1897. A preliminary account of the marine annelids of the Pacific coast with descriptions of new species. . . . Proc. Calif. Acad. Sci. Zool., ser. 3, vol. 1, No. 5, pp. 153–198, pls. 5–10.

1901. The Polychaeta of the Puget Sound region. Proc. Boston Soc. Nat. Hist., vol. 29, No. 18, pp. 381–437, 19 pls.

KINBERG, J. G. H.

1867. Annulata nova. Ofv. Vet. Akad. Forh. Stockholm, vol. 23, No. 9, pp. 337–357.

KRÖYER, HENRIK
1856. Meddelelser om ormeslaegten *Sabella* Linn., isaer dans nordiske Arter. Overs. Danske Videnskab. Selsk. Forh. (1856), pp. 1–36.
LANGERHANS, PAUL
1884. Die Wurmfauna von Madeira. IV. Zeits. wiss. Zool., vol. 40, pp. 247–285, pls. 15–17.
LEUCKART, RUDOLPH
1849. Zur Kenntniss der Fauna von Island. Erster Beitrag (Würmer). Arch. Naturg., vol. 15.1, pp. 149–208, pl. 3.
LEVINSEN, G. M. R.
1882. Systematisk-geografisk Oversigt over de nordiske Annulata, Gephyrea, Chaetognathi og Balanoglossi. Vidensk. Medd. Naturh. Foren. Kjøbenhavn, pt. 1, pp. 160–251, pl. 7.
LINNÉ, CARL
1758. Systema Naturae. Ed. 10.
1767. Systema Naturae. Ed. 12.
MCINTOSH, WILLIAM C.
1874. On the Annelida of the Gulf of St. Lawrence. Ann. Mag. Nat. Hist., ser. 4, vol. 13, pp. 261–270, pls. 9–10.
1885. Annelida Polychaeta. *In* Report on the scientific results of the voyage of H.M.S. *Challenger* . . . 1873–76 . . . Zoology, vol. 12, pt. 34, pp. 1–554, 84 pls.
1900. A monograph of the British annelids. II. Polychaeta. Amphinomidae to Sigalionidae. Vol. 1, pp. 215–442, pls. 24–42.
1908. A monograph of the British annelids. I–II. Polychaeta. Nephthydidae to Ariciidae. Vol. 2, pp. 1–524, pls. 43–87.
MALM, AUGUST W.
1874. Annulater i hafvet utmed Sverges vestkust och omkring Göteborg. Göteborgs Vetensk. Samh. Handl., vol. 14, pp. 71–105, 1 pl.
MALMGREN, ANDERS J.
1865. Nordiska Hafs-Annulater. Förh. Öfv. Kongl. Vet. Akad. Stockholm, Nos. 1, 2, 5, pp. 51–110, 181–192, 355–410, pls. 8–15, 18–29.
1867. Annulata Polychaeta Spetsbergiae, Groenlandiae, Islandiae et Scandinaviae hactenus cognita. Pp. 1–127, 14 pls.
MARENZELLER, EMIL VON
1876. Zur Kenntniss der adriatischen Anneliden. Sitzb. Akad. Wiss. Wien, vol. 72, pp. 129–171, 4 pls.
1879. Südjapanische Anneliden. Denkschr. Akad. Wiss. Wien, vol. 41, pp. 1–46, 6 pls.
1890. Annulaten des Beringmeeres. Ann. Naturh. Hofmus. Wien, vol. 5, pp. 1–8, 1 pl.
1892. Zoologische Ergebnisse der im Jahre 1889 auf Kosten der Bremer Geographischen Gesellschaft von Dr. Willy Kükenthal und Dr. Alfred Walter ausgeführten Expedition nach Ostspitzbergen. Polychäten. Zool. Jahrb., vol. 6, pp. 397–434, pl. 19.
1904. Zoologische Ergebnisse. XIII. Polychäten des Grundes, Gesammelt 1893, 1894. Denkschr. Akad. Wiss. Wien, vol. 74, pp. 295–321.
MESNIL, FÉLIX
1897. Études de morphologie externe chez les annélides. II. Remarques complémentaires sur les spionidiens. Bull. Sci. France et Belgique, vol. 30, pp. 83–100, pl. 3.

Monro, C. C. A.

1928. On the Polychaeta collected by Dr. Th. Mortensen off the coast of Panama. Vidensk. Medd. Naturh. Foren. Kjøbenhavn, vol. 85, pp. 75–103, 19 figs.

1930. Polychaete worms. *Discovery* Reports, vol. 2, pp. 1–222, 91 figs.

1933. The Polychaeta Errantia collected by Dr. C. Crossland at Colón in the Panama region and Galápagos Islands during the expedition of the S.Y. *St. George*. Proc. Zool. Soc. London (1933), pt. 1, pp. 1–96, 36 figs.

1936. Polychaete worms. II. *Discovery* Reports, vol. 12, pp. 59–198, 34 figs.

1937. Polychaeta. Scientific reports of the John Murray Expedition, 1933–34, vol. 4, No. 8, pp. 243–321, 28 figs.

1939a. Polychaeta of the *Rosaura* Expedition. Nov. Zool. London, vol. 41, pp. 345–354, 4 figs.

1939b. On some tropical Polychaeta in the British Museum, mostly collected by Dr. C. Crossland at Zanzibar, Tahiti and the Marquesas. II. Families Syllidae and Hesionidae. Nov. Zool. London, vol. 41, pp. 383–393, 4 figs.

Montagu, George

1808. Description of several marine animals found on the south coast of Devonshire. Trans. Linn. Soc. London, Zool., vol. 9, pp. 81–114, pls. 2–8.

1818. Description of five British species of the genus *Terebella* of Linné. Trans. Linn. Soc. London, Zool., vol. 12, pp. 340–344, pls. 11–13.

Moore, J. Percy

1902. Descriptions of some new Polynoidae with a list of other Polychaeta from North Greenland waters (and Alaska). Proc. Acad. Nat. Sci. Philadelphia, vol. 54, pp. 258–278, pls. 13–14.

1903. Polychaeta from the coastal slope of Japan, and from Kamchatka and Bering Sea. Proc. Acad. Nat. Sci. Philadelphia, vol. 55, pp. 401–490, pls. 23–27.

1905a. New species of Polychaeta from the North Pacific, chiefly from Alaskan waters. Proc. Acad. Nat. Sci. Philadelphia, vol. 57, pp. 525–554, pls. 34–37.

1905b. New species of Ampharetidae and Terebellidae from the North Pacific. Proc. Acad. Nat. Sci. Philadelphia, vol. 57, pp. 846–860, pl. 44.

1905c. Five new species of *Pseudopotamilla* from the Pacific coast of North America. Proc. Acad. Nat. Sci. Philadelphia, vol. 57, pp. 555–569, pl. 37.

1906a. Descriptions of two new Polychaeta from Alaska. Proc. Acad. Nat. Sci. Philadelphia, vol. 58, pp. 352–355, 2 figs.

1906b. Additional new species of Polychaeta from the North Pacific. Proc. Acad. Nat. Sci. Philadelphia, vol. 58, pp. 217–260, pls. 10–12.

1908. Some polychaetous annelids of the northern Pacific coast of North America. Proc. Acad. Nat. Sci. Philadelphia, vol. 60, pp. 321–364, 4 figs.

1909a. The polychaetous annelids dredged by the U.S.S. *Albatross* off the coast of southern California in 1904. I. Syllidae, Sphaerodoridae, Hesionidae and Phyllodocidae. Proc. Acad. Nat. Sci. Philadelphia, vol. 61, pp. 321–351, pls. 15–16.

1909b. The polychaetous annelids dredged in 1908 by Mr. Owen Bryant off the coasts of Labrador, Newfoundland, and Nova Scotia. Proc. U. S. Nat. Mus., vol. 37, No. 1703, pp. 133–146.

1910. The polychaetous annelids dredged by the U.S.S. *Albatross* off the coast of southern California in 1904. II. Polynoidae, Aphroditidae and Segaleonidae. Proc. Acad. Nat. Sci. Philadelphia, vol. 62, pp. 328–402, pls. 28–33.

1911. The polychaetous annelids dredged by the U.S.S. *Albatross* off the coast of southern California in 1904. III. Euphrosynidae to Goniadidae. Proc. Acad. Nat. Sci. Philadelphia, vol. 63, pp. 234–318, pls. 15–21.

1923. The polychaetous annelids dredged by the U.S.S. *Albatross* off the coast of Southern California in 1904. IV. Spionidae to Sabellariidae. Proc. Acad. Nat. Sci. Philadelphia, vol. 75 (Append.), pp. 179–259.

Moore, J. P., and Bush, K. J.

1904. Sabellidae and Serpulidae from Japan, with descriptions of new species of *Spirorbis*. Proc. Acad. Nat. Sci. Philadelphia, vol. 56, pp. 157–179, pls. 11, 12.

Müller, Otto Frederich

1776. Zoologiae Danicae prodromus, seu animalium Daniae et Norvegiae . . ., pp. 1–274.

1788. Zoologica Danica, seu animalium Daniae et Norvegiae . . ., vol. 1, ed. 3, pp. 1–52; vol. 3, ed. 3, pp. 1–71, 1789.

1806. Atlas to above volumes.

Murdoch, John

1884. Description of seven new species of Crustacea and one worm from Arctic Alaska. Proc. U. S. Nat. Mus., vol. 7, pp. 518–522.

1885. Natural history of Alaska. Vermes. *In* Report of the International Polar Expedition to Point Barrow, Alaska, pt. 4, pp. 152–156.

Nilsson, David

1928. Neue und alte Amphicteniden. Goteborgs Vetensk. Samh. Handl., vol. 33, No. 4, pp. 1–96, 30 figs.

Oersted, Anders S.

1843. Groenlands Annulata Dorsibranchiata. K. Danske Videns. Selsk. Naturv. Math., vol. 10, pp. 155–216, 8 pls.

1845. Über die Entwickelung der Jungen bei einer Annelide und über die aüsseren Unterschiede zwischen beiden Geschlechtern. Arch. Naturg., vol. 11.1, pp. 20–23, pl. 2.

Okuda, Shiro

1937a. Some ariciid worms from Japan. Annot. Zool. Japon., vol. 16, No. 2, pp. 99–105, 6 figs.

1937b. Annelida Polychaeta in Onagawa Bay and its vicinity. I. Polychaeta Sedentaria. Sci. Rep. Tôhoku Univ., ser. 4, vol. 12, No. 1, pp. 45–69, 12 figs., pl. 2.

1938a. The Sabellariidae of Japan. Journ. Fac. Sci. Hokkaido Univ. Zool., ser. 6, vol. 6, No. 3, pp. 235–253, 11 figs.

1938b. Polychaetous annelids from the vicinity of the Mitsui Institute of Marine Biology. Japan. Journ. Zool., vol. 8, No. 1, pp. 75–105, 15 figs.

1939. Annelida Polychaeta in Onagawa Bay and its vicinity. II. Polychaeta Errantia. Sci. Rep. Tôhoku Univ., ser. 4, vol. 14, No. 2–3, pp. 219–244, 14 figs.

PAGENSTECHER, H. A.
1862. Untersuchungen über niedere Seethiere aus Cette. I. *Exogone gemmifera* und einige verwandte Syllidien. Zeits. Wiss. Zool., vol. 12, pp. 265–283, pls. 25–26.

PALLAS, PETER SIMON
1766. Miscellanea zoologica quibus novae imprimis atque obscurae animalium species describuntur et observationibus inconibusque illustrantur. Pp. 1–244, 14 pls.

PETTIBONE, MARIAN H.
1949. Polychaetous annelids of the Polynoidae from the northeastern Pacific, with a description of a new species. Amer. Mus. Nov., No. 1414, pp. 1–5, 9 figs.
1951. A new species of polychaete worm of the family Polynoidae from Point Barrow, Alaska. Journ. Washington Acad. Sci., vol. 41, No. 1, pp. 44–45, 1 fig.
1953. Some scale-bearing polychaetes of Puget Sound and adjacent waters Pp. 1–89, 40 pls.

RANZANI, CAMILLO
1817. Neue Würmer. Isis von Oken, vol. 1, pp. 1449–1480, pl. 11.

RATHKE, HEINRICH
1843. Beiträge zur Fauna Norwegens. Nova Acta Acad. Leop. Carol., vol. 20, No. 1, pp. 1–264, 12 pls.

RIOJA, ENRIQUE
1941. Estudios annelidológicos. III. Datos para el conocimiento de las fauna de poliquetos de las costas del Pacífico de México. Anal. Inst. Biol. México, vol. 12, No. 2, pp. 669–746, 9 pls.
1943. Estudios annelidológicos. VIII. Aportaciones al conocimiento de los exogoninos (anel. poliquetos) de las costas Mexicanas del Pacífico. Anal. Inst. Biol. México, vol. 14, No. 1, pp. 207–227, 47 figs.

SARS, MICHAEL
1835. Beskrivelser og iagttagelser over nogle moekelige eller nye i havet ved den Bergenske kyst levende dyr. . . . Pp. 1–81, 15 pls.
1851. Beretning om en i Sommeren 1849 foretagen zoologisk Reise i Lofoten og Finmarken. 5. Annelider. Nyt. Mag. Naturv., vol. 6, pp. 196–211.
1860. Om de ved Norges Kyster forekommende Arter af Annelides laegten *Polynoë*. Vidensk. Selsk. Kristiania, pp. 54–62.

SMITH, S. I., and HARGER, O. (and VERRILL, A. E.)
1874. Report on the dredgings in the region of St. George's Banks in 1872. Trans. Connecticut Acad. Arts Sci., vol. 3, pp. 1–57, 8 pls.

SOUTHERN, ROWLAND
1914. Archiannelida and Polychaeta. *In* Clare Island survey» Pt. 47. Proc. Roy. Irish Acad. Dublin, vol. 31, pp. 1–160, 15 pls.

STIMPSON, WILLIAM
1854. Synopsis of the marine Invertebrata of Grand Manan. Smithsonian Contr. Knowl., vol. 6, pp. 1–66, 3 pls.

STØP-BOWITZ, C.
1941. Les glycériens de Norvège. Nyt. Mag. Naturv., vol. 82, pp. 181–250 4 pls., 14 figs.
1946. Les scalibregmiens de Norvège. Nyt. Mag. Naturv., vol. 85, pp. 63–87, 2 pls., 6 figs.

1948a. Les flabelligériens Norvégiens. Bergens Mus. Åarb. 1946/47, Naturv., No. 2, pp. 1–59, 13 figs., 12 pls.

1948b. Sur les polychètes arctiques des families des glycériens, des ophéliens, des scalibregmiens et des flabelligériens. Tromsø Mus. Aarsh., vol. 66, No. 2, pp. 1–58, 18 figs.

1948c. Polychaeta from the *Michael Sars* North Atlantic deep-sea expedition 1910. *In* Rep. Sci. Results *Michael Sars* North Atlantic Deep-sea Exped. 1910, vol. 5, No. 8, pp. 1–91, 51 figs., 5 tables.

SUMNER, F. B., OSBURN, R. C., and COLE, L. J.

1913. Annulata. *In* A biological survey of the waters of the Woods Hole and vicinity. Bull. U. S. Bur. Fish., vol. 31, pt. 2, pp. 615–636.

THÉEL, JOHAN H.

1879. Les annélides polychètes des mers de la Nouvelle-Zemble. Svenska Vetensk. Akad. Handl., vol. 16, pt. 3, pp. 1–75, 4 pls.

THORSON, GUNNAR

1946. Reproduction and larval development of Danish marine bottom invertebrates. Medd. Komm. Havundersøg. Kjøbenhavn, vol. 4, No. 1, pp. 1–523, 198 figs.

TREADWELL, A. L.

1922. Polychaetous annelids collected at Friday Harbor, State of Washington, in February and March, 1920. Publ. Carnegie Inst., No. 312, pp. 171–181, 37 figs.

1925. A list of the annelids collected by Captain R. A. Bartlett in Alaska, 1924, with a description of a new species. Proc. U. S. Nat. Mus., vol. 67, art. 29, No. 2601, pp. 1–3, 4 figs.

1937. Polychaetous annelids collected by Captain Robert A. Bartlett in Greenland, Fox Basin, and Labrador. Journ. Washington Acad. Sci., vol. 27, No. 1, pp. 23–36, 16 figs.

VERRILL, ADDISON EMORY

1873. Report upon the invertebrate animals of Vineyard Sound and the adjacent waters, with an account of the physical characters of the region. Rep. U. S. Fish Comm. for 1871–72, pp. 295–778.

1874a. Brief contributions to zoology from the Museum of Yale College. Results of recent dredging expeditions on the coast of New England. Amer. Jour. Sci. Arts, vol. 7, No. 4–8, pp. 38–46, 131–138, 405–414, 498–505, pls. 4–8.

1874b. Explorations of Casco Bay by the U. S. Fish Commission in 1873. Proc. Amer. Assoc. Adv. Sci., vol. 22, pp. 340–395, 6 pls.

1879. Notice of recent additions to the marine invertebrata of the northeastern coast of America, with descriptions of new genera and species and critical remarks on others. Proc. U. S. Nat. Mus., vol. 2, pp. 165–206.

1881. New England Annelida. Pt. I. Historical sketch, with annotated lists of the species hitherto recorded. Trans. Connecticut Acad. Arts Sci., vol. 4, pt. 2, pp. 285–324, pls. 3–12.

1882. Notice of the remarkable marine fauna occupying the outer banks off the southern coast of New England, and of some additions to the fauna of Vineyard Sound. Amer. Journ. Sci., ser. 3, vol. 24, pp. 360–371 (plates referred to published in Hartman, 1944a).

WEBSTER, H. E.

1879a. Annelida Chaetopoda of the Virginia coast. Trans. Albany Inst., vol. 9, pp. 201–272, 11 pls.

1879b. The Annelida Chaetopoda of New Jersey. Rep. New York State Mus., vol. 32, pp. 101–128.

1886. The Annelida Chaetopoda of New Jersey. Rep. New York State Mus., vol. 39, pp. 128–159, pls. 4–10.

WEBSTER, H. E., and BENEDICT, J. E.

1884. The Annelida Chaetopoda from Provincetown and Wellfleet, Massachusetts. Rep. U. S. Fish Comm. for 1881, pp. 699–747, 8 pls.

1887. The Annelida Chaetopoda from Eastport, Maine. Rep. U. S. Fish Comm. for 1885, pp. 707–755, 8 pls.

WESENBERG-LUND, ELISE

1934. Gephyreans and annelids. *In* The Scoresby Sound Committee's second East Greenland expedition in 1932 to King Christian IX's Land. Medd. Grønland, vol. 104, No. 14, pp. 1–38.

1939a. Pelagic polychaetes of the families Aphroditidae, Phyllodocidae, Typhloscolecidae and Alciopidae. II. Biology. *In* Report on the Danish oceanographical expeditions 1908–10 to the Mediterranean and adjacent seas, pp. 1–46, 29 figs.

1939b. Polychètes et géphyriens de Tunisie. Bull. Stat. Océanogr. Salambo, No. 39, pp. 1–20.

1947. Syllidae (Polychaeta) from Greenland waters. Medd. Grønland, vol. 134, No. 6, pp. 1–38, 15 figs.

1948. Maldanidae (Polychaeta) from west Greenland waters. Medd. Grønland, vol. 134, No. 9, pp. 1–58, 29 figs.

1949. Polychaetes of the Iranian Gulf. Danish Sci. Invest. Iran, pt. 4, pp. 247–400, 47 figs.

1950a. Polychaeta. *In* The Danish *Ingolf*-Expedition, vol. 4, No. 14, pp. 1–92, 10 pls., 67 charts, 2 figs.

1950b. The Polychaeta of west Greenland. . . . Medd. Grønland, vol. 151, No. 2, pp. 1–171, 37 charts, 4 tables.

1951. Polychaeta. *In* The Zoology of Iceland, vol. 2, pt. 19, pp. 1–182, 12 figs., 62 charts.

WIRÉN, AXEL

1883. Chaetopoder från Sibiriska Ishafvet och Berings Haf insamlade under *Vega*-Expeditionen 1878–1879. *In Vega*-Exped. vetenskapliga Iakttagelser. . . . af A. E. Nordenskiöld, vol. 2, pp. 383–428, pls. 27–32.

1901. Über die während der schwedischen arktischen Expedition von 1898 und 1900 eingesammelten Anneliden. Zool. Anz., vol. 24, p. 253.

ZACHS, I.

1933. Polychaeten vom Nordjapanischen Meer (Bucht *Peter der Grosse*). Issled. Morei USSR, Gosud. Gidrol. Inst., Leningrad, fasc. 19, pp. 125–137.

ZATSEPIN, V.

1948. Klass Polychaeta. *In* Opredelitel fauny i flory severnykh morei USSR, N. S. Gaevskaia-Sokolova, pp. 94–167, figs. 18–22, pls. 28–39.

U. S. GOVERNMENT PRINTING OFFICE: 1954